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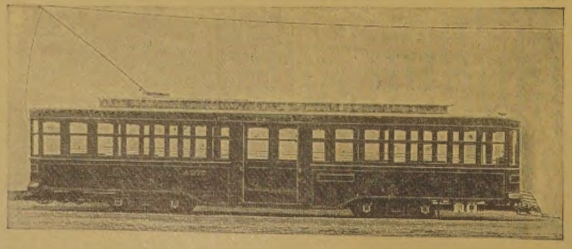
**Alphabetical Index and Classified Directory fourth page following text**

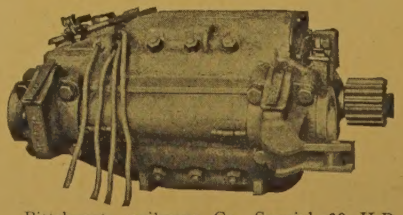
# *Pittsburgh Promotes Progress*

"JOE," said the General Manager to his master mechanic, "I saw something in the papers recently about specially built motors for the low side-entrance cars that the *Pittsburgh Railways Company* has been using as trailers for the past two years. Do you know anything about them?"

"Yes, sir; I do," Joe answers. "I have a report on them about ready, and you will have it in a day or so. It is one of the cleverest schemes that has been introduced in a long time. You know they are a progressive bunch down in Pittsburgh. A two-motor equipment will not negotiate the grades in that city, so they developed a 30 hp. motor that would have ample clearance on a 24-inch wheel. The total seating capacity of the car is 67; the total weight, equipped, is 33,000 lbs. So you see we've all got to take our hats off to Pittsburgh."



Pittsburgh Railways Co. Low Side-Entrance Car.



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EAST PITTSBURGH, PA.

# Electric Railway Journal

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### OPERATION OF THE EJECTMENT RULES

During the high tide of summer picnic riding the most delicate task of the conductor is the safe ejectment of intoxicated passengers. The standard rules on "Ejectments" and "Where to Eject" cover this possibility very well so far as general conditions are concerned, but it is very desirable that through some such means as carhouse notices these rules should be made especially conspicuous at this season. More definite instructions might be added to the general rules by naming the places where ejectments should not be made under any circumstances. The railway's moral, if not legal, responsibility for the safety of a helpless inebriate does not end with his ejectment from the car. On city streets, particularly, such a person is in imminent danger of being run down by fast-moving vehicles. On interurban lines the intoxicated passenger should not be set down at any stop which is near an open bridge or trestle or at any other place where an injury to the ejected person might be expected. In general, the conductor on a city car should be instructed to delay the ejectment until a policeman or an outside fellow-employee can be obtained to serve as an escort. On at least one interurban line the conductors are told definitely the stops at which they should not eject a passenger.

### THE ETHICS OF PATENTS

A number of magazine articles have been published recently discussing plans for reforming the patent office, and particularly the present patent law. Whatever may be the sentiment about patents in other lines of business, certainly all those engaged in electric railway work in its different phases should be in favor of the broad principle of protecting the inventor. The industry is one which is the product peculiarly of inventive genius, and its continued development is dependent upon the efforts of the inventors. Every man who makes a real contribution to the art, or thinks that he has made one, is entitled to the limited return which the government grants to him in the way of a brief monopoly of the use of his invention. There are, of course, inventors and inventors. We have comparatively little sympathy for the man who attempts by ingenious combination of phrases only to anticipate an art. But to the man who really produces something which is worth while and by the courage of his convictions attempts to demonstrate the commercial practicability of his device we feel that every encouragement should be offered. Those connected with the operating departments of electric railway companies are often in a better position perhaps than those engaged in the manufacture of electric railway apparatus to understand the needs of the industry and perceive a means by which these needs can be supplied. We urge all such to keep their eyes open, and if their inventions are worth patenting to protect themselves in the possession of their ideas. By doing so they will afford a basis for the commercial development of their invention, and the industry as a whole will be benefited. In view of the unprofitable character of most patents the earnings of the successful inventor should not be begrudged.

**INDUSTRIAL MOVING PICTURES**

The increasing use of moving pictures illustrating industrial activities of various kinds suggests the desirability of the use of this effective educational tool in connection with many of the problems of electric railway operation which directly concern the public. In the electric lighting and power field a striking appeal to the general populace has been made by the use of films showing how electricity is revolutionizing the life of the home and the farm as well as the shop, and one of the "high spots" of the recent Seattle convention of the National Electric Light Association was a moving picture display showing the part electricity is now playing in irrigation pumping on Western ranches. In the electric railway field there is an admirable opportunity to impart the always important lesson of how to board and leave a car without danger, the results of improper alighting and the exercise of due care in crossing tracks. Beyond this the moving picture film can readily be pressed into service to show the public the hidden side of the industry, including such interesting points as the repair of cars, inspection of brakes and truck rigging, testing of motors, examination of candidates for employment, administration of trainmen's schools, use of company hospital facilities, and the starting and stopping of engines, turbines, etc. Construction views taken hours apart may be placed in juxtaposition and the time element thus ignored. Only a small percentage of the people who patronize the cars have the slightest conception of these phases of the industry and its work, and for this reason there is little doubt that the presentation of such subjects would attract popular interest no less than such topics as the launching of boats and the locomotives and operation of signals on steam railroads.

**PREPAYMENT CARS IN REVIEW**

The development of the prepayment car in American electric railway practice has been so widespread and so rapid that it has appeared practically impossible to attempt any general review that would not be antiquated almost as soon as it was published. Nevertheless, an excellent foundation for such a survey is afforded by the "Brooklyn Report on the Equipment and Constructional Features of Prepayment Cars," as abstracted in this issue, which summarizes the striking points of prepayment cars as used on sixteen properties in thirteen cities. Even those who have followed the prepayment car situation from week to week in the columns of this journal must marvel at the enormous amount of invention and experimentation which has been done since the year 1905, when the Montreal Street Railway courageously undertook the operation of "pay-as-you-enter" cars. So many variations in design, such as "pay-within," "near-side" and "center-entrance," have since been introduced to meet the different conditions that it has become desirable to apply the term "prepayment" to them as a class. The impressions gained upon reading this report are, first, that despite many variations in design there has been a steadfast adherence to the original plan of collecting the fare at or near the entrance; and second, that there has also been a decided effort still further to reduce boarding and alighting accidents by the introduction of gates, doors and other platform barriers. In fact, the evolution of the prepayment car presents the interesting condition where the by-product, "reduction of accidents," has become as important as the basic product, "collection of all fares." The present outlook indicates that the next few years at least will see a welcome continuance of that spirit of progressiveness in car design which has received so much impetus from the invention and advocacy of the prepayment principle.

## PURCHASE OF COAL UNDER SPECIFICATIONS

The United States government as a purchaser of some $8,000,000 worth of coal each year naturally takes a leading position in the movement for the purchase of coal under specifications, and in the recently published Bulletin 41 of the Bureau of Mines a description has been given of the methods used in carrying out this plan.

To purchase coal because it is supposed to come from a mine of established reputation is an absurdity from a business standpoint, although coal dealers, and in many cases coal users, cling to it with surprising tenacity. Many millions of dollars' worth of coal are bought each year on this basis by purchasers who would not for a moment consider the possibility of buying a car body without any specifications other than its over-all dimensions. In most cases, probably, the omission of specifications in a coal contract is due to the objection of the dealer to be bound by any consideration other than that of making prompt deliveries, but, as a matter of fact, a definite statement of just what the dealer agrees to furnish is quite as likely to result profitably for him as a vague understanding which leads inevitably to complaints from the consumer whenever the latter's boilers fail to steam freely. If the consumer does not know exactly what he contracted for, nor what he is receiving, it is natural for him to be suspicious that the coal dealer has "put one over" whenever the firemen get careless or any other exterior cause tends to decrease the capacity of the boiler furnaces or increase the fuel demand.

The purchase of coal under specifications should not be construed to mean that a dealer is required to guarantee a minimum heating value below which the coal must not fall under penalty of cancellation of the contract. On the contrary, the liability to variation can be recognized and the price varied as the heat value of the coal rises above or falls below a definite standard of quality. This furnishes a basis for settling disputes regarding the quality of the coal delivered and the price to be paid if the fuel is either better or poorer than specified. If the quality is uniformly below the guaranteed standard, there exists a definite basis for settlement, either by the substitution of another coal or by the cancellation of the contract.

It is seldom that coal will be rejected under any system of purchasing when it is of poor quality, not only on account of the difficulty of obtaining other coal on short notice but also because of the cost of removing it from the dissatisfied customer's bins and the improbability of finding another customer willing to take it. Experience has generally shown that unless a coal is so bad as to be wholly incapable of being used in the plant it is preferable to accept it at a reduced price, and the advantage of a definite basis for settlement of this contingency is manifest.

The method recently adopted by the government in mak-

ing awards of coal contracts differs from that used during the past three years because it expresses the heat value on a basis of "dry coal" instead of coal as received, and by establishing the moisture in the coal as it is delivered this obviates necessity for indeterminate allowances for moisture which may be absorbed or evaporated from the coal between the times of weighing at the mines and at delivery.

All bids on a given contract are adjusted to a common basis of ash content by selecting as the standard that proposal which contains the lowest percentage of ash. Each 1 per cent of ash in the other coals above this is considered to add 2 cents per ton to the price of the coal with the higher ash content, and when this adjustment is made the adjusted price per ton divided by the b.t.u. specified per pound multiplied by the number of pounds per ton gives the price per b.t.u. This is usually multiplied by 1,000,000 and expressed as price per 1,000,000 b.t.u. The lowest bidder on this adjusted basis receives the contract.

The bidder is not expected to furnish a sample of his coal but specifies instead the percentage of ash in the "dry coal," and the heating value expressed in b.t.u. If the bid is accepted, payments are made for coal as delivered at the rate per b.t.u. which it is actually found to contain by a test with a bomb calorimeter. The moisture content of the coal as delivered is determined upon receipt, and the percentage of the shipment which consists of water is deducted from the total to establish the actual weight of "dry coal" received. In case the percentage of ash in the "dry coal" exceeds the figure in the proposal by less than 2 per cent no penalty is entailed, but for each 1 per cent or fraction thereof more than this an increasing penalty is charged. This, for the first five units, is 2, 4, 7, 12, and 18 cents per ton deducted from the contract price, the theory being that as a coal contains more ash it becomes increasingly difficult to handle in a fire and entails extra labor in cleaning fires and removing ashes.

Of course, such a procedure may appear impossibly complicated for all except the largest coal users, but as a matter of fact the routine work can be made perfectly simple. None of the calculations is involved, and even the bomb calorimeter can be set up and operated without much trouble. The moisture test requires only an accurate balance and a drying oven surrounded by a bath of two parts of glycerine and one part of water, which are kept boiling by a gas flame. In this samples of coal can be dried immediately upon receipt and the moisture determined by the percentage of weight lost in drying. The ash content is obtained by burning a weighed sample of "dry coal" in a muffle furnace for one and one-half hours, the percentage remaining after burning being the ash. The determination of the heating value is more complicated, requiring a bomb calorimeter, in which a sample of known weight is burned in an atmosphere of oxygen under a heavy pressure, the heat so produced being absorbed by a water jacket containing a known weight of water, of which the temperature rise is accurately determined. Corrections for the nitrogen and sulphur content may be made if that refinement is necessary, and the heat value of the sample of coal is determined by multiplying the weight of water plus the water equivalent of the apparatus by its temperature rise.

As there is no necessity for prompt determination of the ash and of the heat value, these determinations can be made by a local chemist, and samples should be tested from each car of coal received. The cost, in comparison to the savings which are made possible, is negligible.

## PAINTING STEEL BRIDGES AND STRUCTURES

The subject of painting steel in bridges and structures where it is exposed to the elements deserves careful consideration. It has been estimated that the ultimate life of steel structures out in the open is approximately forty years, where the design is based on a factor of safety of four and a loading slightly in excess of the actual requirements. This estimate of life is based on results obtained from structures in service and from tests made to show the actual condition of the metal at the end of the forty-year period.

In order to obtain this maximum service from any structure the selection of a metal preservative and the preparation of the metal surface cannot receive too much attention. Careful investigations carried on by the United States government experts tend to show that all corrosion is due to electrolytic action. This action receives impetus from impurities in the metal itself and from the presence of moisture on exposed metal surfaces. Corrosive action also proceeds more rapidly when the surrounding medium contains sulphuric acid, which is a prevalent condition where coal is used or stored in the vicinity of steel structures. To insulate the metal surface from this action, the paint surface must be perfected at all times, and the cheapest way to keep it in perfect condition is to retouch each year the points where scale or blisters develop. It is not necessary to give the entire structure one or two coats of paint as soon as failure occurs in the preservative skin; these defective surfaces may be merely cleaned and painted. To insure the condition of the whole structure it should be painted two coats at least every six or seven years, and where the conditions are extraordinarily severe, as in coal bunkers or stacks, the time must be shortened.

One of the problems one must necessarily meet in actual service is the method of application. We have personal knowledge of a case where two gangs of painters used paint from the same barrel to paint two structures located so that the service conditions were exactly similar, yet the paint on one structure failed in eighteen months and the other was in perfect condition at the end of four years. The results in these cases were evidently due to care in application. One must not permit a liberal use of oil when the paint is taken from a fresh barrel. Experience has shown that ready-mixed paints, if anything, contain too much oil when sent out by the manufacturer.

To be positive that each structure receives two coats of paint when required, the first and second coats should be of two distinct colors. It is always best on new work, particularly when the steel is inspected at the mill, to make one coat of paint a part of the fabrication contract, and when the steel is not inspected a single coat of linseed oil should be required. This will leave the metal in a condition to be inspected on delivery and at the same time prevent corrosion in transit.

Another point of importance is the attention that a corroded surface should receive before applying a coat of

paint. It should be thoroughly cleaned of all paint scale, rust or dirt until the metal surface is bright, if the maximum life of the paint is to be obtained. Too much time is often allowed between the cleaning and painting, and a new coating of rust appears. The cleaning and painting cannot follow each other too closely. After all, the engineer is wholly dependent on the honesty of his paint foreman. There is always the possibility, however, that he has not been properly instructed and cautioned as to the proper method of application to secure the best results. One must not forget that every rust scale means a reduction in the sectional area of the metal, and the time will come, if the preservation of the metal does not receive proper attention, when the bridge will fail or have to be replaced before the maximum life of the structure is obtained.

## THE LOW-FLOOR CAR

The advent of the low-step, center-entrance car has already marked the year of 1912 as notable in the history of car design. Each one of the three types which we have previously described is remarkable for the ingenuity of its designers in utilizing the center-entrance idea in an original and distinctive manner. Notwithstanding this variety of existing designs, the fourth center-entrance car to be brought out, the "low-floor" car of the Pittsburgh Railways Company, differs so widely from the others that the center door is almost the only feature in common. The problem of light weight has even been attacked in a different manner than usual, the designers cutting out weight principally from the trucks instead of from the body. The new car has, in all probability, had a longer and more normal period of development than the others, as its construction is the result of two years' experience with center-entrance trailer cars. For this reason hardly one of its numerous original features, with the exception of the motor, can be said to be purely experimental.

The general design of the car body is interesting not only because of the astonishingly high seating capacity but also on account of the decision of its designers to retain the familiar plan of a practically level floor, and passengers make the two steps necessary to board the car under the eyes of the conductor. This construction permits the structural details of the body to agree very closely with standard design, the all-important low steps being obtained through the use of 24-in. wheels with motors to suit, and it is this feature more than any other which makes the car of such exceptional interest.

It is hardly necessary to say that in late years the demand for powerful motors has necessitated the use of large wheels to provide sufficient clearance, and that these wheels in turn have maintained car steps at a burdensome height. This has, in fact, been brought forcibly before surface railways in a number of instances. The burden of the high car step does not, however, fall only upon the passengers. Schedule speeds must be appreciably decreased where there are delays in loading and unloading, accidents are more likely to occur, and in most localities a certain amount of profitable short-haul traffic is lost because some people often conclude that the effort of boarding a car is greater than a short walk.

With the new motor and "low-floor" truck the high-step difficulty disappears. Substituted for a standard truck under a standard car body the car floor is lowered between 7 in. and 10 in. In some existing cars where the design of the underframe permits it the floor could be lowered enough by the use of these trucks to dispense altogether with one of the customary three rises, the boarding passengers stepping direct from the street to the platform. When it is considered that such arrangements can be made with no changes to the car body and will result in a reduction of some 2500 lb. in the weight of each car on account of the lighter trucks and motors, the importance of the development can be appreciated. Based on a rate of 5 cents per pound per year, the reduction in weight would effect an annual saving in power for car operation alone of $125.

As it stands, the low-floor car establishes a record, so far as we have knowledge, for weight per seated passenger. Although the present car is made up from a rebuilt trailer body and is without the refinements of a final design, the total weight per seat with the car completely equipped and ready for service is 487 lb. The weight per foot of length is 725 lb. and, owing to the absence of platforms, all of this length is available for passengers. The remarkably low unit weight is largely due to the seating capacity of sixty-seven, a high figure for a 45-ft. all-steel car, as the car body has been designed throughout with a factor of safety of five. At the same time, the careful design of the body has eliminated every particle of unnecessary material. The greatest reason for the light weight is, however, the fact that between 1 ton and 2 tons are saved by the small trucks, wheels and motors.

The small motors, which are, as before mentioned, practically the only experimental feature of the car, have so far shown better results than were expected. They are, on account of the 24-in. wheels, operated at about 40 per cent higher speed than standard motors, geared with the same ratio—3½ to 1—to wheels of normal size. However, a standard motor with a gear ratio of 5 to 1 would have to run at the same number of revolutions per minute as the new motor to produce the same car speed. Since the armature diameter of the new motor is very much reduced, it is evident that the peripheral speed of the armature, with the present gear ratio of 3½ to 1, must be considerably below normal. It might very naturally be inferred from these figures that the new motor would either start the car very sluggishly, especially so with a trailer, or else take such heavy drafts of current as to cause abnormal heating. Neither is the case. One theory which has been advanced to explain this paradoxical condition, aside from the fact that the motor has been very carefully designed, is that the effect of the inertia of the armature itself is a very material part of the starting load. Since the weight and diameter of the armature have been materially reduced in the new motor without decreasing the torque or the capacity, it would seem quite possible that this theory is correct; but in any event it is to be hoped that the experiments which are now being carried out will demonstrate the reason for the ability of these "baby" motors successfully to handle loads for which motors of double their rated capacity are usually found necessary.

## CONTINUOUS SERVICE A FACTOR IN SAFE OPERATION

The importance of continuous service from the economic point of view is generally appreciated by electric railway officers, and it is also well known that one of the most important factors in securing safe operation is the maintenance of an established schedule. The relation between safety and uniform operation is much closer than the public sometimes appreciates. In one of the superior courts of Massachusetts an interesting example recently occurred in a suit by the widow of a porter killed on the overhead structure of the Boston Elevated Railway Company between one of the elevated stations and a signal tower. The question at issue was that of permitting the jury to take a view of the spot where the accident happened. The court officers had been instructed to be ready to take the jury to the scene of the accident, when, upon advices received from the superintendent of the elevated division, the trial justice refused to permit the taking of the view. The company showed that four trains in each direction are passing the spot in question every ten minutes of the day, and pointed out that if the view were taken it would be necessary to hold northbound traffic ten minutes at the nearest station, such a disarrangement of the running time opening the way to possible danger to passengers as well as being a serious inconvenience. On these grounds the court declined to take the responsibility of permitting the view by the jury.

Another case of possible danger from traffic obstruction or irregularities in car service was effectively treated by a recent Supreme Court decision, also in Boston. The plaintiff entered a northbound car at the Park street station of the Tremont street subway and in so doing dropped a violin case upon the track. As the car started the conductor closed the vestibule door and refused to allow the car to be stopped or to permit the plaintiff to alight until the next station was reached. The conductor informed the plaintiff of the company's rule prohibiting the stopping of cars in the subway between stations, and the violin was not recovered. The plaintiff expressly disclaimed any negligence as to the manner in which the car started.

The court held that the company was not liable, stating that the case was governed by the established rule that a railroad company is not bound to stop a train between stations for the purpose of allowing a passenger to search for lost property, even of great value. In Henderson vs. Louisville & Nashville Railroad, 123 U. S. 61, the plaintiff dropped property valued at $9,000 from the car window, losing it thereby, and brought suit against the company. Mr. Justice Gray, writing the opinion of the court, said: "She did not intrust her bag to the exclusive custody and care of the defendant, and even if no negligence is to be imputed to her, her dropping the bag was not the act of the defendant or its servants nor anything that they were bound to foresee or to guard against; and after it happened she had no legal right for the purpose of redelivering her from the consequences of an accident for which they were not responsible to require them to stop the train short of a usual station, to the delay and inconvenience of other passengers and the possible risk of collision."

In the Boston case the car had gone but 2 or 3 ft. when the accident happened, but a second car was following within 20 ft. The court sustained the company's contentions that the conductor was under no legal duty to cause the car to stop; that he was obeying a reasonable rule of the transportation department; that if the car had been stopped the conductor would have been negligent, and that there was no negligence of the carrier in respect to the personal baggage of the plaintiff. It was also shown that the danger of collision is greater in a subway than elsewhere, should a car stop unexpectedly, that the reasonable rule forbidding inter-station stops facilitates rapid transit on converging routes liable to traffic congestion and that an added danger might arise from an inter-station subway stop due to the impression of passengers that they had arrived at their proper destination.

## TRANSPORTATION INSPECTION RECORDS

Until some emergency arises it is difficult for a company to realize the value of detailed operating records in the work of transportation inspectors. Under normal service conditions the duties of street inspectors appear to be largely routine in character, and often there seems to be little worthy of record in the ceaseless round of junction points, carhouses and traffic centers which occupies their attention. Yet it cannot be too strongly emphasized that every unusual and significant occurrence should find a place in the memorandum book and carhouse log.

The inspector of traffic must be something of a newspaper man in his ability to seize and record the unusual and important conditions and happenings with which he has to deal. Months after a motorman is called to account for missing a run through unpunctuality or because of careless operation of his car it may become necessary to refer to the date of the occurrence. The acceptance by a conductor of an improper transfer, or some infraction of the rules noted by the inspector, may be disposed of at the moment by a little well-graded advice, but it will not do to overlook the posting of such observations in a suitable record file or memorandum if the company desires to be able at any future time to refer to the records of specific employees in accurate detail. The service as a whole may be taken care of by the provision of a substitute, but unless the log shows from that time forth the name of the man who failed to appear, his number and explanation, the best type of discipline is not conserved and in some cases the company may be criticised for misjudgment. In other words, the time has come when as much care should be taken to file accessible records of operation of cars and the work of crews as is now devoted to the performance of power house and substation machinery. The inspector may be able to touch only the high spots of operation with his observations and criticisms, but with recommendations for improvements in the details of handling traffic should go at least brief records of actions taken and noted. Some managers may feel that so long as their inspectors keep the cars moving on schedule time nothing more is of importance, but emergencies in the court room, before state tribunals and elsewhere soon bring out the value of short but accurate records of the unusual points covered from day to day.

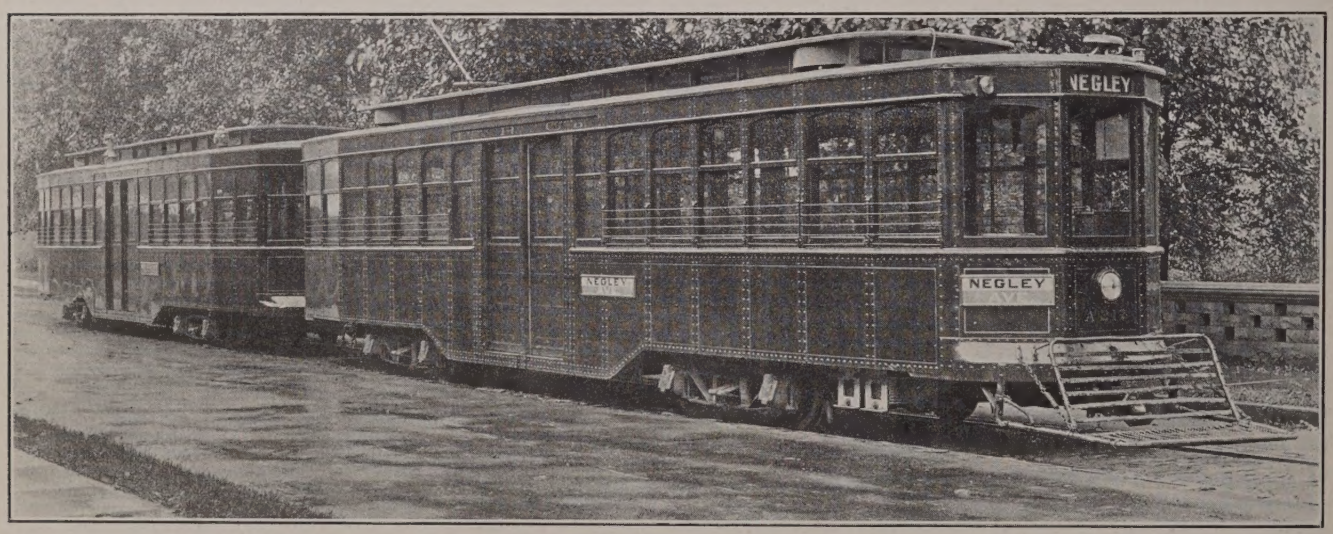
# The Pittsburgh Low-Floor Car

A Description of the Latest Center-Entrance, Easy-Access Car, Including an Account of the New Motor Which Has Made the Development of the Car a Practical Possibility

To the remarkable developments in side-entrance, low-step motor cars during the present year still another type has been added in the form of the "low-floor" car of the Pittsburgh Railways Company. The commanding feature of this car is the fact that the low step has not been obtained by radical innovation in car-body design but by developing a lilliputian motor of enormously increased unit output. This makes it of vital importance to the electric railway field.

### DEVELOPMENT

Two years ago the Pittsburgh Railways Company put into service fifty very light trail cars of the center-entrance type, their distinctive features being the absence of interior partitions and bulkheads, a low floor level and the use of 22-in. wheels on the trucks. These are believed to be the first center-entrance closed cars for city service where the entrance space was not considered as a platform and therefore partitioned off from the rest of the car by means of bulkheads and doors. They were described in the ELECTRIC RAILWAY JOURNAL for Dec. 10, 1910, page 1155, and for Jan. 20, 1912, page 88.




**Low-Floor Car—General View of Car Coupled to Trailer for Rush-Hour Operation**

Soon after the cars were placed in service the Pittsburgh Railways officials became impressed with their easy-access features and decided to try one in operation as a motor car. Negotiations were started with motor manufacturers to secure electrical equipment to operate these cars, but no motor of either the mining, automobile or railway type was found which could be mounted on axles with 22-in. wheels and yet give sufficient clearance to pass over obstructions on the street. The manufacturers without exception were skeptical as to the possibilities, both commercial and operative, for a motor of such design and for this reason were unwilling to assume the risk of development. Notwithstanding this, the railway company's officials were convinced of the practicability of the plan, and in consequence they themselves arranged for the design and development of the new motor at the expense of the railway company, although no direct financial return could accrue from the experiment.

The motor, which was developed under the direction of F. R. Phillips, superintendent of equipment, and P. N. Jones, general superintendent, of the Pittsburgh Railways Company, was designed generally along standard lines except that it was increased in length along the shaft and the diameters of both armature and frame were very materially reduced. This enabled it to be carried upon a 24-in. wheel with 3½-in. clearance or upon a 22-in. wheel with 2½-in. clearance. Owing to the severe operating conditions in Pittsburgh, however, the former clearance was considered to be the limit.

With the development of a small motor it became possible to equip the low-floored Pittsburgh trailers as motor cars, and on one of them the underframing has been strengthened as necessary and the seating plan rearranged to make room for a motorman. This trailer body has been mounted on trucks having 24-in. wheels with one of the new motors on each axle and has resulted in a low-floor, center-entrance car weighing, fully equipped, only 32,650 lb. Since the seating capacity is sixty-seven, the astonishing figure of 487 lb. per seat is obtained notwithstanding the fact that every stress member on the car has been designed, not estimated, with a factor of safety of at least five.

It may be remembered that at the last American Electric Railway Association convention, in the discussion of "two-car train operation," one of the Pittsburgh Railways officials referred to this intended experiment as follows:

"We have in Pittsburgh a center-entrance trail car with 22-in. wheels, the floor level of which is a little less than 30 in. from the rail. This makes one step into the car, and it is the quickest loading car we have ever had. Almost without exception the trailer conductor has given his signal to the high-platform motor-car conductor before the latter has his passengers on or off. We have a scheme in Pittsburgh, which we are arranging to try out, by which we expect to bring the weight of a sixty-passenger motor car down to 32,000 lb."

The "low-floor" car is the result of this scheme.

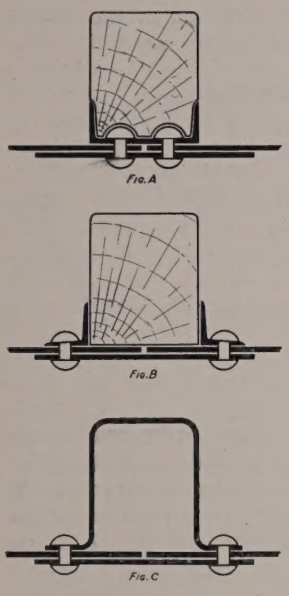
### CAR BODY

The Pittsburgh trailer cars were built originally by the Standard Steel Car Company, and with the exception of the floors, roof and window sashes are completely of steel.

*Proceedings of American Electric Railway Transportation & Traffic Association, 1911, page 525.

The minor changes required in the trailer body used for the new motor car, however, were made in the shops of the railway company.

As described in previous issues of this paper, the weight is supported by the side framing, which acts as a pair of girders extending the full length of the car. The side sheathing below the belt rail is made of 3/32-in. steel plates riveted to pressed-steel posts and to the side sills. At the center doors there are heavy reinforcements to transmit the compressive stress in the belt rails up over the doorway and down to the opposite belt rail. The floor is carried on needle beams supported from the side sills, although the end thrusts from the bumpers are taken up by a pair of center sills extending the full length of the car. The body bolster is of the box-girder, fish-body type, composed of continuous top and bottom plates and double pressed-steel webs, with a steel casting riveted to all at the center. The web pieces and the sides of the steel casting have holes cut away along the neutral axis to reduce the weight, the center pin key being accessible through the center holes and not through a hole in the car floor, as is customary.



Development of Posts

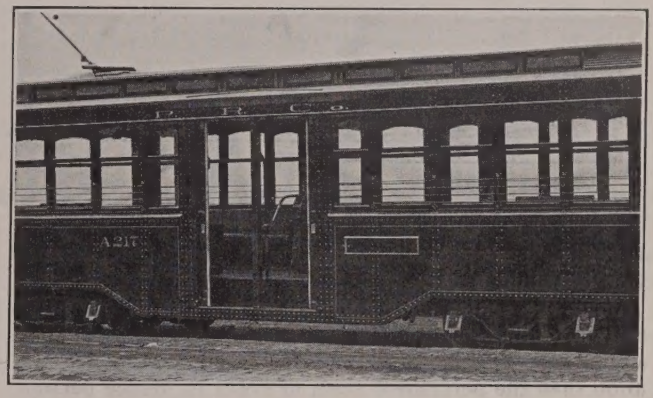
An interesting detail showing the gradual gravitation toward the use of steel is the change in design of posts. The first partially steel car put in use in Pittsburgh in 1909 had wood posts, held between a light channel, as in Figure A. The second type of car also had wood posts, but the channel was changed to two angles as shown in Fig. B, with the idea of more easily removing the side plates in case of injury. The third type of car, the car described in this article, has substituted for the wood and two angles an all-steel post weighing one-half as much as the wood and angles, as shown in Fig. C.

In every part of the car stresses have been computed with great care. The design of the car body throughout has been carried out on the basis of a factor of safety of five. For the trucks a factor of safety of nine has been used. These factors are based upon dead loads in all cases. To the side-sheathing plates, however, there was given additional thickness, aside from the matter of strength, owing to the necessity for using plates heavy enough to roll smooth and thus insure a good appearance.

No well is installed in the center of the car. The whole floor has been made practically level, primarily for the purpose of reducing interior accidents occurring through passengers being thrown by sudden stops and starts. There is, however, a short incline from the top of the step to the center line of the floor. Incidentally this permits the installation of the auxiliary equipment underneath the car in the usual manner. Patents have been issued to P. N. Jones covering this type of car body.

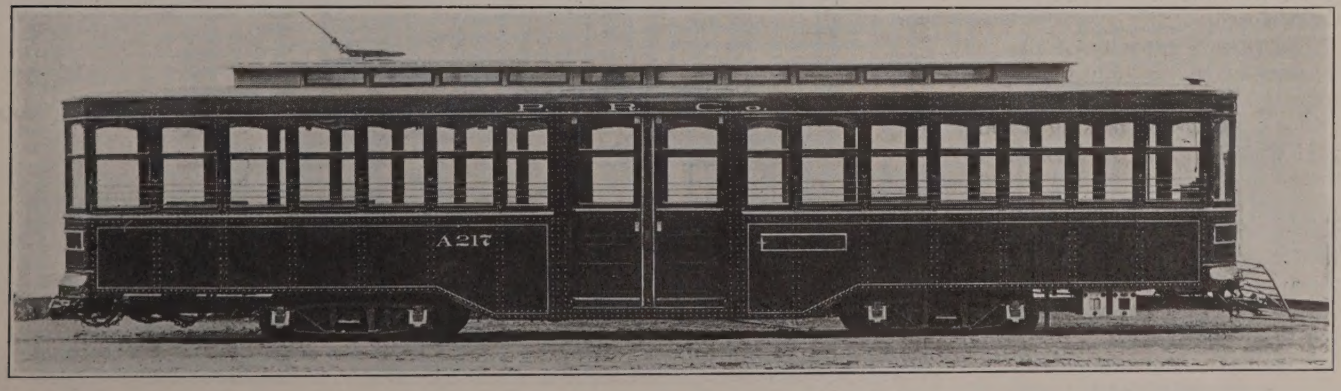
INTERIOR ARRANGEMENT

Of the car body the most novel feature is the seating arrangement. Longitudinal seats are extended along both sides of the car and around the rear end, as the car is equipped for single-end operation. At the front end four seats are cut out to provide room for the controller and brake valve, but one of these is saved by locating a single seat on a stanchion just back of the motorman. No compartment for the motorman is provided, but a drop curtain on the stanchion behind him shields him from the glare of the interior lighting.



Low-Floor Car—Side View Showing Interior Step

At each end of the wide space provided between the longitudinal seats are placed two intermediate seats which stand lengthways with the car. One of these seats three and the other two passengers. The seats are slightly to one side of the center line of the car, the seat backs being so located that there is ample room for passengers on the longitudinal side seat behind them. The intermediate seats are of standard construction, upholstered with woven cane, but the supports are cut away at the floor in the rear to give ample room for the feet of passengers moving about behind them. Each intermediate seat back is held rigid by a brass rail extending between it and the side of the car, and these rails prevent a single passenger from occupying the entire space on the longitudinal seat which is behind either of the intermediate seats. Space is provided between the two intermediate seats at each end of the car so that the longitudinal seat space back of them is easily accessible. In actual operation, in fact, there even appears to be a prefer-



Low-Floor Car—Side View of Drop Sides to Provide for Interior Step

ence on the part of passengers to use this space, possibly on account of the fact that any one seated there is never bothered by persons standing or passing through the car.

The intermediate seats were located only at the ends of the car in order to attract passengers away from the center door and thus reduce congestion at that point. The plan works out very well in practice and reduces to a surprising degree the difficulty, so common in city operation, of getting passengers to move away from the entrance after boarding a car.

Along the center door opposite to the one in operation are two folding longitudinal seats, each capable of holding two passengers. These have been placed at a higher elevation than the permanent seats in order to induce persons using them to sit well back and thus prevent them from extending their feet out into the valuable floor space near the entrance. In fact, the entire arrangement as well as the level floor shows that the elimination of congestion at the doors has been made a primary consideration.

The center doors are made in halves, with a post in the center of the doorway. Each half door is individually operated by a pneumatic cylinder with a dampening device to avoid injury to passengers and is controlled by a small valve handle placed on the center post within easy reach of the conductor. The low car floor requires only one intermediate step between it and the street level. This step is placed inside of the doors so that no projection beyond the car siding exists either with the doors open or with them closed.

The seating capacity of the car is sixty-seven, an unusual figure for a 45-ft. car. The standing capacity is forty-six, making a total paying load of 113. Neither of these figures is estimated. Both were taken from actual counts in service conditions, and it is, in fact, reported that it is quite customary for the car to get loads during the rush-hour varying from 105 to 110 passengers.

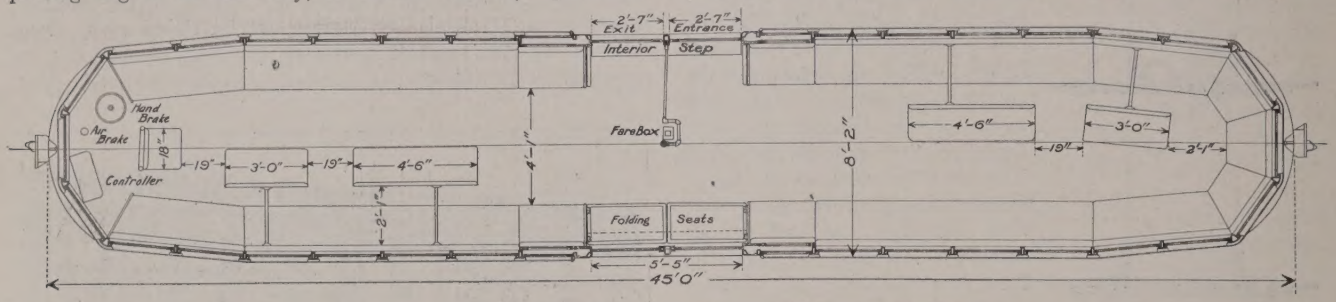
GENERAL DIMENSIONS AND WEIGHTS.

The principal dimensions of the car are as follows:

| | |
|---|---|
| Length over buffers | 45 ft. 0 in. |
| Width over all | 8 ft. 2 in. |
| Truck centers | 21 ft. 8 in. |
| Wheelbase of truck | 5 ft. 0 in. |
| Size of wheel | 24 in. |
| Height from rail to top roof | 10 ft. 6 in. |
| Weight completely equipped, including couplers | 33,750 lb. |
| Weight with couplers, safety chains and drawbar rigging removed | 32,650 lb. |
| Permissible truck-center-plate load | 20,000 lb. |
| Truck center plate, height | 19 in. |
| Weight of each truck without motors | 4,220 lb. |
| Weight of each motor | 1,484 lb. |
| Seating capacity | 67 |
| Standing capacity | 46 |
| Weight of completely equipped car per seated passenger | 487 lb. |

None of these weights was estimated, all being taken on accurate track scales, with the car and trucks in complete operating condition. In this connection it should be stated that while the car is equipped for single-end operation the standard 150-lb. contactor, which the Pittsburgh Railways Company uses on all its double-truck cars, is also used with this car, and that with the single exception of the motors every piece of electrical apparatus on the car is the same as is used with the company's quadruple 60-hp equipments.

It is believed that a light form of multiple-unit control can be developed which will not only decrease further the weight of the car but will actually increase the seating capacity because of the small space required for the master controller.



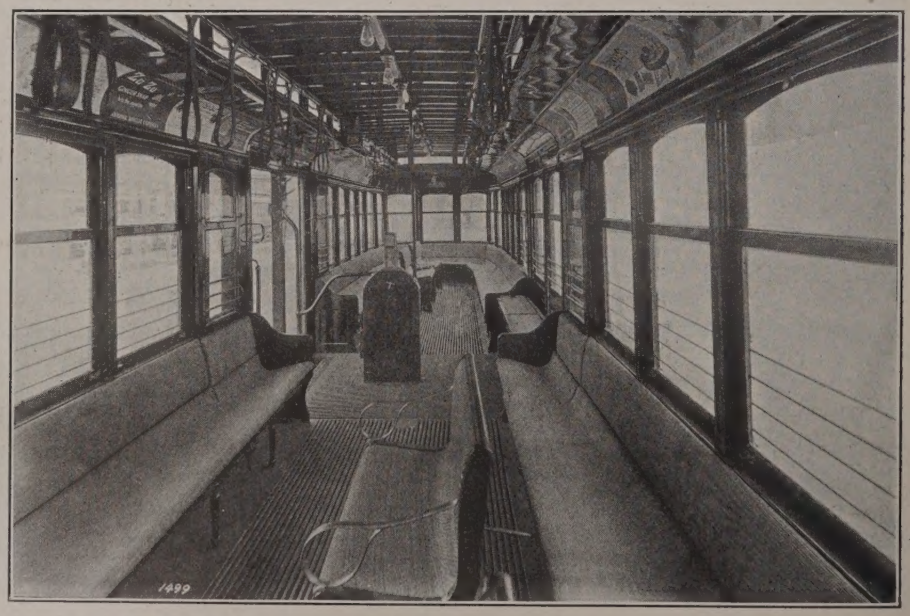

Low-Floor Car—Plan View Showing Seating Arrangement

TRUCKS

The low truck with its small motor is naturally the one among all of the original features of the car which is of the greatest interest. It is of the standard transom, arch-bar type, with self-lubricating center bearings and roller side bearings, and is designed with a factor of safety of nine for 20,000 lb. center-plate load. The compression member of the truck side frame is formed of an inverted channel and the truck throughout is made up of commercial shapes, no special rolled or pressed steel members being used. In general the arrangement follows standard practice, although some of the details of construction are special and have been patented.

The brake rigging is of the beamless type, with a horizontal cross-equalizing lever carried just above the motor. Standard semi-automatic air brakes are installed with the usual hand-brake connection for use in emergencies.

The wheels are 24 in. in diameter, giving the motor a



Low-Floor Car—Interior View Showing Intermediate Aisle Seats

3½-in. clearance above the top of the rail and permitting the location of the center plate 19 in. above the rail. They are of solid rolled steel, in accordance with the standard practice of the Pittsburgh Railways Company, and each pair with its axle weighs 970 lb. This weight, it may be said, covers wheel rims 2½ in. thick, which in the final design will be reduced, thus taking off 100 lb. from the weight of each pair.

The hammer blow of non-spring-supported weight is naturally cut practically in half on account of the light wheels and motors. Since the dead weight due to the half of the motor which is supported directly on the axle is 742 lb., the total weight effective for knocking down rail joints is only 1712 lb.

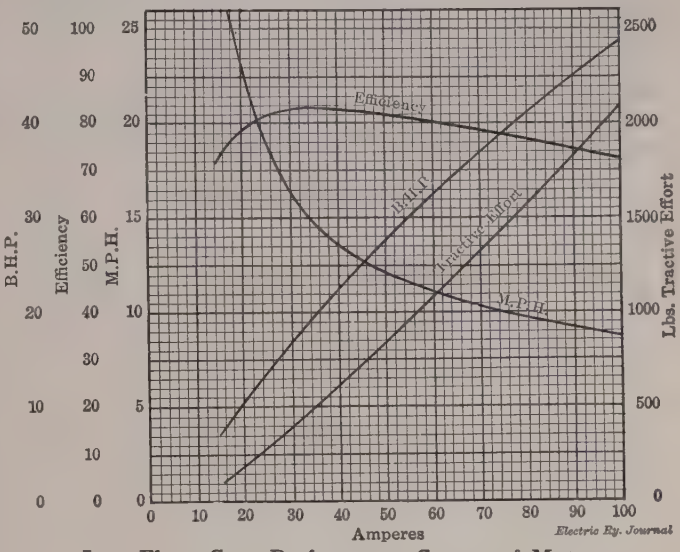
Heat-treated axles 4 in. in diameter are used. These have standard 3¾-in. x 7-in. journals and carry M.C.B. standard journal boxes and brasses for that size. The small journals are the natural outcome of the general reduction in weight both of car body and trucks.

MOTORS

The motor, upon the successful design of which was based the entire plan for a light, low-floor car, is of the inside-hung, spring-supported type. It is drawn out along the shaft and small in diameter. This attenuated feature of construction was necessary in order to obtain space for the material required in a motor of the desired capacity, since the maximum allowable diameter was restricted by the small diameter of the car wheel. The nominal rating is 30 hp. for one hour with 75 deg. rise at 500 volts and with a draft of 58 amp. Its complete weight without gear and gear case is 1484 lb.

The field frame is of soft steel, cast in one piece, of the box type, and is approximately octagonal in shape, extending over the axle. To the extension the axle caps are bolted, thus relieving the axle-cap bolts of strain. At each end of the magnet frame there is a large bored opening through which the armature pole pieces and field coils may be removed. These openings are closed by solid housings, carrying the shaft, solid bearings and oiling arrangements. The housings are securely bolted to the frame and have two tapped holes diametrically opposite for use in forcing the housing off.

To provide access to the brushes and brush holders there is a large opening over the commutator which is closed by a malleable-iron cover, held in place by an adjustable cam-locking device and provided with a spring to prevent the cover from rattling. On the lower end of the motor are provided inspection openings which are closed with malleable-iron dust-proof covers. Two tapped drain holes are provided through the bottom of the frame.




Low-Floor Car—Performance Curves of Motor

The four main pole pieces are built up of laminated sheet steel, riveted to heavy end plates, and are bolted to finished seats on the frame, thus making a good magnetic fit. The pole pieces are bolted in by stud bolts with nuts on the outside of the frame, where they can be easily reached with a wrench.

There are four main field coils which are first served with repeated tapings and then impregnated, in a vacuum tank, with an insulating, heat-conducting and waterproofing compound having a dropping point of 450 deg. By means of heavy tapings and repeated dippings the coils are sealed and can withstand moisture and internal heat. A metal shield protects the coils from mechanical injury and holds them rigidly without any chance for vibration.

The commutating poles are of steel and are firmly bolted to finished seats on the frame. The insulation on the commutating-pole coils is similar to that used on the main field

Low-Floor Car—Comparison of Low-Floor Truck with Standard

Low-Floor Car—Comparison of Wheels and Motor with Standard

Front View of Motor

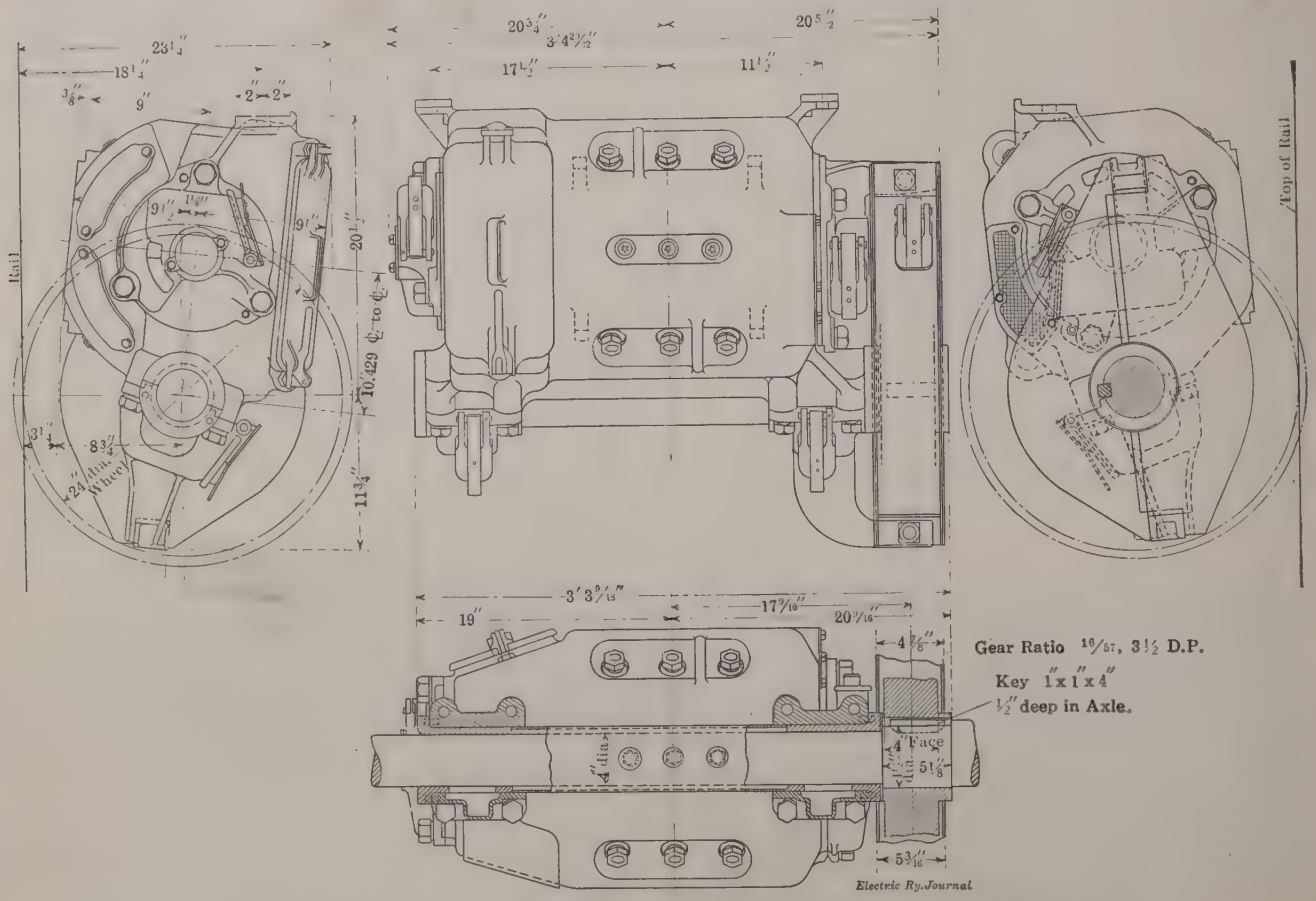
coils. Provision is made to hold these coils rigidly and also to prevent vibration.

The armature bearings are of bronze and are carried in housings which are securely bolted to the field frame. Ample lubrication is provided for by large oil pockets, for saturated waste, having openings into the low-pressure sides of the bearings. A separate oil reservoir permits the fresh oil to be fed and filtered up through the waste to the bearings. The depth of the oil in the reservoir may be easily gaged so that the most economical height may be maintained. Suitable oil guards and wiper rings prevent the oil from reaching the inside of the motor. The overflow oil is caught in pockets of large capacity in the housings, which are so located as to be easily emptied and cleaned.

PERFORMANCE

At the present early date it is, of course, impossible to give detailed performances of the low-floor car or of its motors. It has, however, been thoroughly established that the car is not only able to maintain its schedule on the severe runs existing in the city of Pittsburgh, which normally tax to the utmost the standard four 60-hp motor equipments, but is also able to haul during the rush hour a 22,000-lb. trailer. The latter seats sixty and carries a total at times up to 100, so that with the trailer the train affords 127 seats and a total capacity of over 200. The combined weight is 430 lb. per seat.

The car has been in daily service on the different runs in Pittsburgh since July 7 and temperature readings on the motors have been taken regularly at the end of the even-




**Low-Floor Car—Drawing of Motor Showing General Dimensions and Clearances**

The gear case is of sheet steel in two parts and is supported at the two ends. This gives a very rigid support against vibration and lateral strains, and practically overcomes the breaking of suspension lugs and gear cases.

With the asbestos heat-proof insulation, which has been used in Pittsburgh for some time and which will eventually be made standard there, it is believed that the rated capacity of the motors can be greatly exceeded even for normal operating conditions, as the temperature ceases to become the limiting factor. Instead, the saturation of the poles appears to be the only limit to the new motors' capacity, and for this reason they were designed with exceedingly liberal magnetic cross-sections. The railway company's officials are now carrying out exhaustive tests upon the motors, and the results, which are to be published as soon as the tests are completed, will in all probability establish a step of marked importance in the art of railway motor design.

With the permission of the Pittsburgh Railways Company, the motor has been formally placed upon the market by the Westinghouse Electric & Manufacturing Company under the designation of No. 328.

ing rush-hour run, after the car has been in normal service all of the day. At no time has the rise above atmospheric temperature, with a single car operation, exceeded 55 deg. C. When the car has been running all day and has then taken a trailer for a record trip lasting for a period varying from one to one and one-half hours the maximum temperature rise found so far has been 68 deg. C. The latter rise was obtained after a run scheduled at 10 m.p.h., averaging seven stops per mile and on which were the severe grades usual on all of the Pittsburgh lines. The car had been on the run all day and had made the rush-hour round trip in the evening with a standard trailer just before the temperature rise of 68 deg. was obtained.

The effect of rolling friction with the small wheels does not appear to be of appreciable importance. The average power required on one line during an eight-day test was 139 watt-hours per ton mile. This line has a scheduled speed of 9.52 m.p.h. and averages seven stops per mile. On the line on which the car is now running the power consumption, averaged for a three-day test, was found to be 125.8 watt-hours per ton mile, the scheduled speed being

9.72 m.p.h. and the stops per mile 6.4. The difference between the two figures is due to the greater opportunity for coasting on the latter run.

The speed obtained when running on full voltage is distinctly high. In fact, it is now planned to increase the gear ratio for the purpose of determining the effect produced on schedule speed with the consequent increased acceleration. As now geared the starting is very easy, although the acceleration is rapid, as is required in order to keep up with the schedules set for the standard 60-hp equipment.

## INAUGURATION OF PREPAYMENT SYSTEM IN ENGLAND

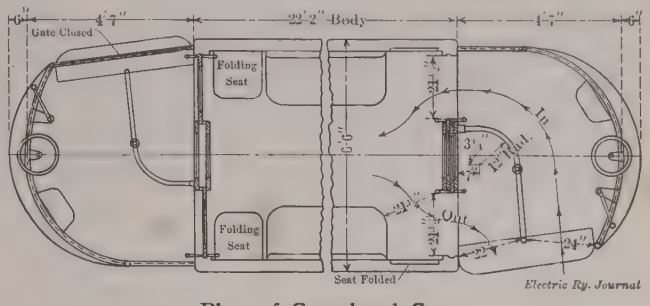
The first prepayment cars in England were successfully inaugurated on June 25 by the Gateshead & District Tramways Company, which is now operating nine cars of this type on its Bensham and Saltwell division. Although the service was begun during Race Week, which is the heaviest in the year, the company reports that there was not a single complaint from either passengers or platform men. Cars for other routes are being converted for the new service as fast as possible.

The opening of the prepayment operation was signalized by the presence of the Mayor of Gateshead (Alderman Costelloe), the Mayoress, the members of the Town Council and other public officials. The Mayor, who had the distinction of being the first person to pay his fare, congratulated the railway company upon the great enterprise it had shown in acting as a pioneer of a car-operating system which deserves every success. In reply, L. C. Huppert, representative of the International P-A-Y-E Tram Car Company, Ltd., London (European representative of the Prepayment Car Sales Company, New York), thanked the Mayor and other officials for their interest in this departure. More than 16,000 prepayment cars, he said, were already in use in 138 cities. He remarked with humor that if there was any latent prejudice against the prepayment car as an American innovation it should be remembered that the development of the pay-as-you-enter system was the result of the brainwork and enterprise of two Scotchmen. C. R. Greene, chairman of the Gateshead & District Tramways

**Gateshead Prepayment Cars in Service**

Company, said that although the system was new he saw no reason why the public could not be educated up to it. W. Morrison, manager of the railway, explained how the public had been advised and prepared for the change by means of car posters and by the distribution of pamphlets. The platform men had also been carefully instructed.

The Gateshead cars are 22 ft. 2 in. over the body with 4-ft. 7-in. platforms. As shown in the accompanying plan, the conductor's platform is divided by a railing into a 24-in. entrance and a 22-in. exit aisle. The later cars will be provided with an exit at the front according to the P-A-Y-E company's plans. The corresponding car-body




**Plan of Gateshead Car**

passages, which are each 21½ in. wide, are formed by sliding the body end doors into a center bulkhead. The seating is longitudinal but folding seats are used opposite the doors to facilitate passenger movement. The accompanying halftone illustration shows that ample provision has been made to display the usual indications of a prepayment car. The fare collection system does not offer any radical departure from American standards inasmuch as there is a uniform fare on this route. Each passenger, however, still receives a ticket as under the old system. Passengers operate a bell signal when they wish to alight.

In addition to the Gateshead installation the P-A-Y-E company has received an order from the Leicester Corporation Tramways for the conversion of ten cars and an experimental prepayment omnibus has already been constructed for the London General Omnibus Company. In view of the fact that the single fare is the exception rather than the rule abroad, it has been necessary to devise a method of prepayment fare collection which will take care of the zone system of operation. The P-A-Y-E company is prepared to do this by means of the ticket system. The conductor in such cases will be provided with as many different colors of tickets as there are zones. The color of the ticket will indicate the destination zone, the check against over-riding being provided by having the passenger deposit his ticket in a glass box as he leaves the vehicle. Special tickets have also been devised for overlapping zone travel. A station ticket-selling system similar to this is familiar to rapid transit riders in London and Berlin, and in this country it has recently been introduced by the New York, Westchester & Boston Railway.

## PUBLIC SAFETY POSTER IN CHICAGO

The Chicago City Railway has recently published a large poster, 18 in. x 22 in., which is carried in its cars and calls attention to the dangerous practice by children of running in front of cars. The center of the poster contains a front view of a car with three boys running in front of it. The wording below is "A Dangerous Place to Play." At the top of the card are the words "Join the Public Safety Crusade," "Parents—Attention." At each side are the injunctions "The Safety of the Children Depends on Your Assistance" and "Warn, Instruct, Prevent Them from Playing on the Tracks." Attention is directed to the card by two red cross insignia printed in red.

The City Club, of Los Angeles, Cal., has adopted a resolution urging the city charter revision committee to insert a clause in the proposed charter providing for twenty-one year franchises for surface railroads and forty-year franchises for subways.

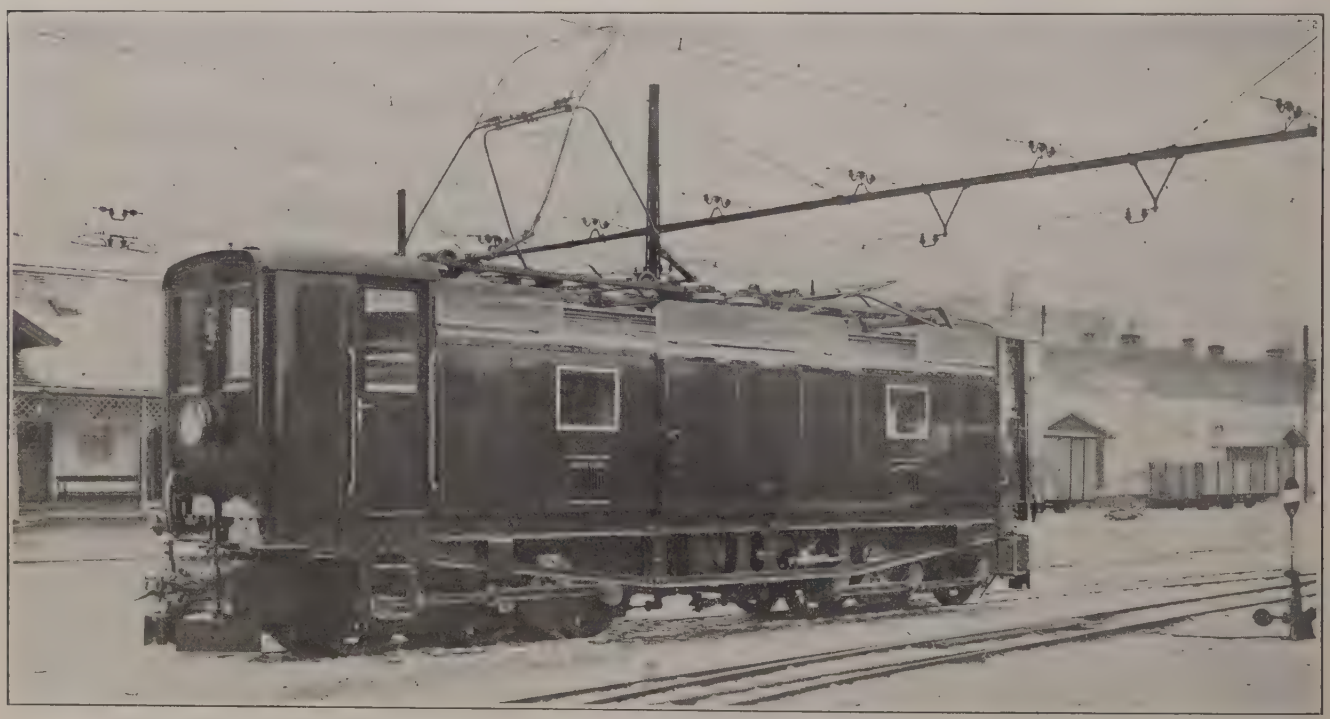
# St. Polten-Mariazell Single-Phase Line of the Austrian State Railways

**A Pioneer 25-Cycle Mountain Line Which Is Operated with Geared Side-Rod Locomotives Throughout**

The mountain railway between St. Pölten, in Lower Austria, and Mariazell, Styria, is a branch of the Austrian Railway. This branch line is the first electric railway in Austria which is equipped on a large scale for locomotive operation, and, although the road is a narrow-gage one (30 in.), it carries a very heavy passenger and freight traffic. The road was originally intended for steam operation. In 1907 it was operated entirely by steam locomotives. The total length of the branch is 51 miles and it contains many severe grades. The track is laid with rails 34 lb. per yard in the stations and 44 lb. per yard in the open. The smallest radius of curvature is 260 ft., and the steepest grade is 2.5 per cent.

The St. Pölten-Mariazell Railway was opened in May, 1907, and the traffic increased more rapidly than it could be handled by steam. During the first year 532,000 people and 127,000 tons of freight were handled. The electric energy is generated for the most part in hydroelectric plants. The water-power is derived from two falls, one at Wienerbruck and the other at Trübenbach. It is planned to develop a third fall at Urmannsau. A standby station has been erected at St. Pölten.

These three stations also furnish electric energy for light and motor service to be distributed to points along the line of the railroad. The three plants of the Elektricitätswerke and the three plants of the railway system are all operated in parallel. The distribution circuit is three-phase and operates at 5000 volts, 25 cycles. In order to be able to use the same machines for the three-phase distribution and for the railway, it was necessary to adopt 25 cycles for railway operation. The three-phase generators in all of the power stations may be connected either to the single-phase railway distribution system or to the three-phase general distribution system.



**St. Pölten-Mariazell Railway—View of Single-Phase Locomotive and Overhead Line Construction**

### POWER STATIONS

The Wienerbruck hydroelectric station has three 1000-hp, 375 r.p.m. turbines, which are directly connected through couplings to the generators. The fourth unit of 2000 hp will be installed later. The generators are 6500 volts, three-phase, and are rated at 1340 kva, three-phase, or 900 kva, single-phase. The new generator will have a rating of 2600 kva, three-phase, or 800 kva, single-phase. The rating of the generators was so chosen that with a single-phase load and a load-factor of 0.8 they would impose full load upon the turbine of 1000 hp and 2000 hp respectively. Each generator has a direct-connected, shunt-wound exciter, and in addition there is one independent excitation unit driven by a 50-hp, 1000-r.p.m. turbine. The transformer room contains three 6500-27,000-volt, three-phase transformers immersed in oil and equipped with water-cooling coils operating three-phase. They are rated at 1350 kva, and single-phase at 900 kva. A special transformer is installed for the lighting of the station.

The Trübenbach power house is designed for three-phase operation exclusively. It has two 1200-kva directly connected generators. The machine potential of 6500 volts is stepped up to 27,000 volts by two three-phase transformers, each being rated at 1200 kva. The third fall of the Erlauff River will be developed at Urmannsau. The equipment will be similar in all respects to that at Trübenbach.

The standby station at St. Pölten is equipped with two 800-hp, four-cylinder, 167-r.p.m. Diesel oil engines direct-connected to the generator. The generators are provided with directly connected exciters and have a rating of 700 kva, three-phase, 420 kva, single-phase, at 25 cycles and 5000 volts, and with a power-factor of 0.8 require 835 hp to drive. In this station the 20,000-volt lines from Wienerbruck to Trübenbach are connected to the primaries of

the distribution transformers which feed the 5000-volt circuits of the city system.

DISTRIBUTION SYSTEM

The energy for the operation of the section between Wienerbruck and the 46-mile post is supplied over a 6500-volt feeder, having a cross-section of 136,000 circ. mils, from the Wienerbruck power station. The other sections are fed from transformer stations in Kirchberg and Ober-Grafendorf, which are connected to the Wienerbruck power station through 27,000-volt, single-phase feeders. From the Ober-Grafendorf substation a feeder leads to the stand-by station in St. Pölten, so that in case of an emergency the road can be fed from that station.

In addition to the single-phase line between the Wienerbruck power station and St. Pölten, there is a three-phase, 27,000-volt line for general distribution, which passes through both transformer substations and by suitable switching equipment is arranged so that if an accident occurs to the single-phase lines the three-phase lines can be connected to the railway distribution circuit. All high-tension lines are insulated with delta insulators which have been tested at 75,000 volts. All poles are grounded by connection either to the rails or to a galvanized-iron wire 2.7 in. in diameter which is clamped to the poles and connected to ground plates at frequent intervals.

In order to insure the grounding of a broken transmission wire, a galvanized-iron ground ring supported by short iron arms surrounds each conductor at a short distance from the insulator, as is shown in one of the illustrations. Because of the reliance on this method of protection, no other means is employed at highway crossings and at other places where the pole spacing is less than 49 ft. At crossings greater than 49 ft., however, ground nets were used. At the crossing over the Reichsstrasse in St. Pölten, in accordance with ordinaces of the town, a wire bridge net completely incloses the line. The high-tension lines are

**St. Pölten-Mariazell Railway — Overhead Construction, Showing Protection for Transmission Wires**

protected against potential rises and lightning strokes by arresters installed at the power stations and substations, where they are under constant observation of the attendants. Heavy strokes are taken care of by spark-gap arresters set for a given maximum potential. Water-jet ground connections are installed for the continuous discharge of small potential rises. Resistors are connected in series with horn lightning arresters so as to limit the discharge current.

KIRCHBERG AND OBER-GRAFENDORF TRANSFORMER SUBSTATIONS

The high-tension lines enter the substation through the side walls and are connected on the inside to a disconnecting

**St. Pölten-Mariazell Railway—Line Construction At and In a Tunnel**

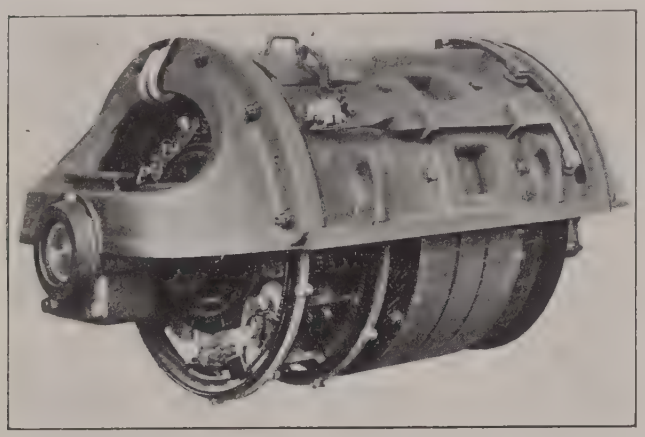
switch, which is operated only when carrying no load. Two oil-insulated, self-cooled single-phase transformers having a continuous rating of 900 kva are installed in each station. In order to take care of the increased traffic a third substation will be erected at Laubenbachmühle and equipped with transformers of the same size as used in the other substations. Hence all transformers will be interchangeable. The working conductor is fed from the substations, there being two feeders from each station, one extending in each direction. The working conductor is divided by section insulators at the substations and at the feeding points between the substations. Under normal conditions the section insulators are short-circuited through a switch, thus tying the whole system together.

OVERHEAD DISTRIBUTION SYSTEM

The working conductor is suspended from a compound catenary. It is of hard copper, has a cross-section of 154,000 circ. mils, and is supported at intervals of 10 ft. by clamps loosely hung on the auxiliary catenary. The auxiliary catenary is a steel wire 0.24 in. in diameter suspended from the main catenary at intervals of about 2.5 in. by hangers which are rigidly attached at both ends. The main catenary is a seven-strand steel cable having a total cross-section of 68,000 circ. mils. In the tunnels where there is much moisture bronze is substituted for steel in the catenary construction. The working conductor is prevented from swinging by gas-pipe braces insulated with two petticoat insulators in series, as shown in the illustrations. On curves the braces are so arranged that they are always under tension. The height of the working conductor over the top of the rail is 18 ft. in the open. An even tension is maintained on the trolley wire by inserting an automatic tension device at intervals of about 0.6 mile. The construction is carried by iron poles either of the lattice type of construction or of broad flange I-beams. In the open where there is only one track the catenary is carried on brackets, the poles being spaced at 165 ft. In the stations where there are several tracks the overhead work is carried

by a channel iron supported by two poles. All poles are grounded to the rails.

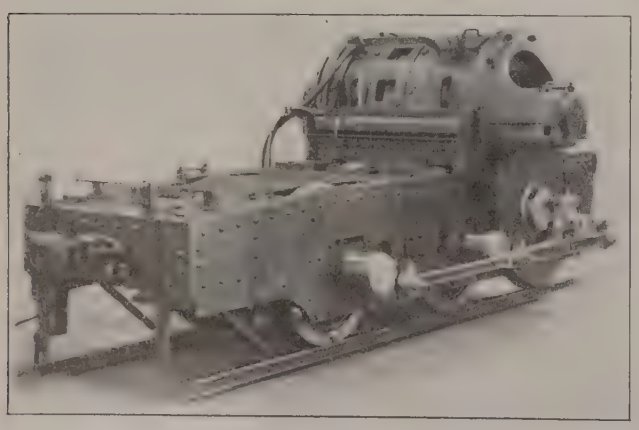
Special construction had to be used in the tunnels in order to carry out the compound catenary type of construction within the clearance limits imposed by the profile of the tunnel. There was only 1.5 ft. available for the over-



St. Pölten-Mariazell Railway—300-hp Single-Phase Motor

head construction. The working conductor was brought within 2 in. of the clearance profile—that is, 12 ft. over the top of the rail—and the construction was supported at intervals of about 60 ft. by three-part insulators mounted in the upper part of the tunnel walls. One of the advantages of mounting insulators on the side walls was the freedom from trouble due to locomotive smoke when steam locomotives were still used on the road.

The overhead conductor has a section insulator at both ends of all tunnels and at all stations so that these portions of the road can be isolated in case of trouble. Then, in order not to interfere with the operation of the road as a whole, by-pass lines are carried around the tunnels and around the stations. The switches connected to these by-pass lines are mounted on the poles and operated from the ground by rods. The section insulators themselves are carried by two brackets spaced about 33 ft. apart, between which two working conductors are strung parallel to each other and about 1 ft. apart. Between these points the two conductors are inclined horizontally in opposite directions,



St. Pölten-Mariazell Railway—Truck, Motor Equipment and Drive of Locomotive

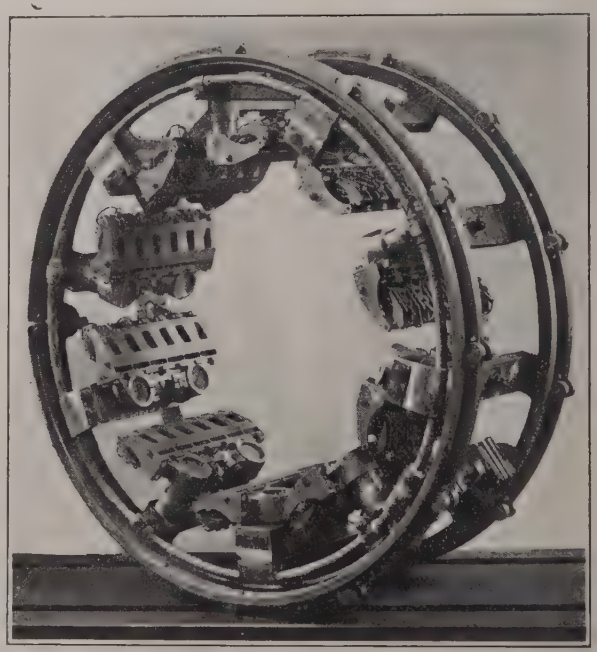
and therefore in passing along the conductor the current collector is transferred from one to the other without shock. At stations section insulators are very much simplified, and are built right into the line itself.

ROLLING STOCK

The motive power equipment consists of fourteen 47-ton locomotives. They will draw a 100-ton train at 25 m.p.h. on a 2.5 per cent grade. The drawbar pull on the same grade is about 5 tons. The maximum tractive effort at the rim of the drivers is 10 tons. The normal acceleration is about 0.68 m.p.h.p.s.

The locomotives are of the double-truck type. Their mechanical parts weigh 24 tons each, and their electrical equipment 23 tons each. Each truck has three driving axles coupled together by side rods. The cranks on one side are displaced 90 deg. from those on the other. All cranks and revolving weights are perfectly balanced. The center of gravity of the motor lies high between the middle and the end axle. The truck side frames are made of steel plates which are connected at the front by the draft gear, at the back by a transom and in the middle by the jack shaft and the motor frame. Each truck has an a.c. series motor which is rated at 300 hp, with 220 volts, 25 cycles and 700 r.p.m. The motor is self-cooled and has no preventive resistance leads in the commutator connections. The gear ratio is 1 to 3. The wheel pressure is approximately 4 tons. The weight of the motors exclusive of the gears, gear case and jack shaft is about 10,000 lb. The gears run in oil.

The locomotive body, which is carried by two side trusses



St. Pölten-Mariazell Railway—Brush-Holder Arrangement of Motor

that are securely tied together by cross-bars, carries all the auxiliary apparatus such as transformers, control, equipment, air pump and current collectors. The king pin is relieved of the weight of the locomotive body by two supports mounted on each side. The roof over the vestibules is somewhat higher than in the body of the car. The low portion of the roof carries the current collectors and the high-tension wiring. The braking equipment consists of a hand brake and an automatic vacuum brake, the brake cylinders and tanks being carried by the underframing of the car.

The locomotive has a Schneider speed indicator which is driven from the jack shaft, and one of the vestibules is equipped with a recording speedometer. The electrical equipment of the locomotive also includes two current collectors, one high-tension circuit-breaker, one high-tension relay, two high-tension fuses, two transformers, two motor controllers, two air-pump motors, lighting and heating apparatus. The lighting and heating of the train is supplied by means of alternating current at 220 volts.

Two direct-connected motor-driven air pumps, one large

and one small, generate a vacuum for the automatic brakes. The brake control and the motor control are so interlocked that when the brakes are applied the motors are automatically disconnected and the motors cannot be started until the brake lever is in the starting position.

The raising and lowering of the current collector may be accomplished from either vestibule by means of a manually operated hoist. The drum of the current-collector hoist is operated by means of a crank handle that can be removed only when the current collector is in its lowest position. This same lever is used to close all the doors of the high-tension compartment and transformer compartment, and it cannot be removed from the compartment doors until they are closed and locked. Therefore the current collector cannot be raised when the high-tension compartments are open.

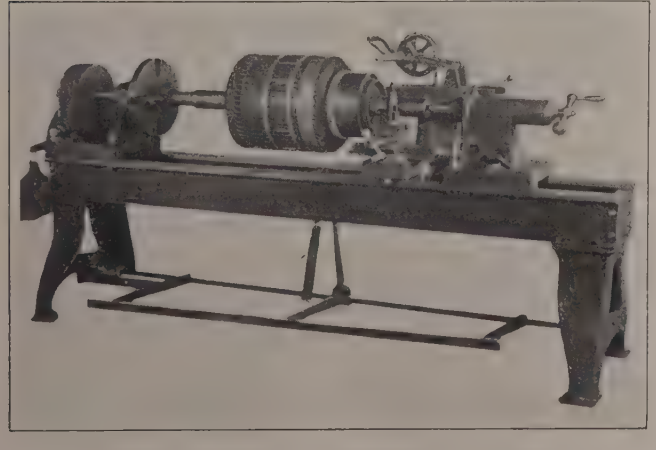
## STORAGE BATTERY CARS FOR CUBA

The Gould Storage Battery Car Company, New York, as general contractor has shipped two Brill storage battery cars to the Cienfuegos, Palmyra & Cruces Electric Railway & Power Company, Cuba, for use on a 7-mile line in Cienfuegos, which is the precursor of a 300-mile standard electric railway system in the province of Santa Clara. These cars have 18-ft. bodies with 3-ft. 9¼-in. vestibules, and are 26 ft. 1½ in. long over the bumpers. The body is built without end doors, the only doors being those in the vestibules, which are operated in conjunction with folding steps. The truck for each car is of the car builder's special design and has Syracuse roller-type journal bearings. Each car has fifty-eight 27-MC Gould cells of approximately 370 amp-hr. capacity, two GE-1022, 85-volt, 30-amp geared motors, two K-45 controllers and a Sangamo type D amp-hour meter. The car is lighted by means of ten 15-watt, 28-volt tungsten lamps. The weight of a completely equipped car, exclusive of the H-B wheel guards, is 15,100 lb. The weight of the batteries alone is 2000 lb.

## A COMMUTATOR SLOTTER

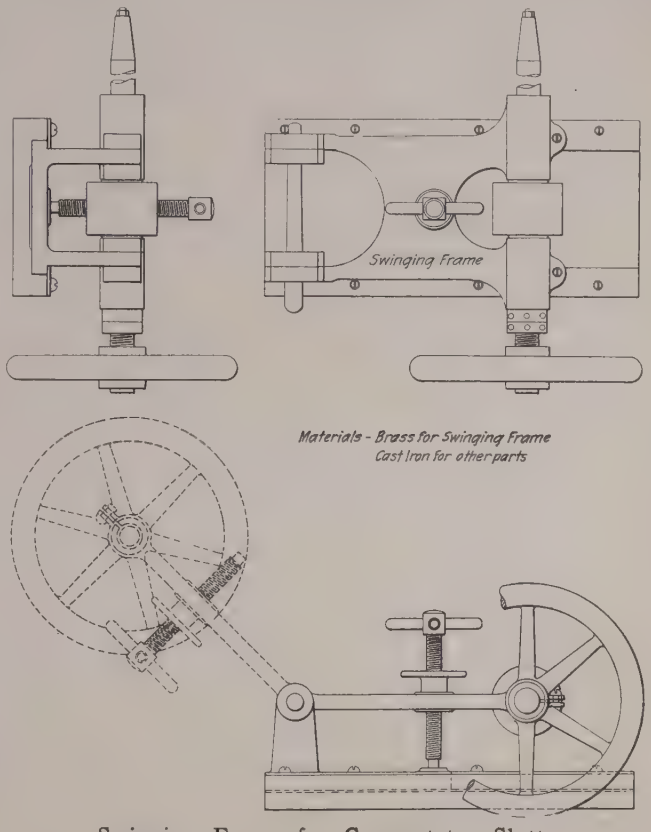
BY H. P. CLARKE, RECENTLY MASTER MECHANIC NEW YORK RAILWAYS COMPANY

During recent years the advantage of slotting commutators has been so fully recognized that the practice has been generally adopted by the leading street railways of the country. With the value of this practice fully established a great many different devices have been evolved for doing this work. A few years ago the writer caught the infection so prevalent at the time, with the result illustrated in the accompanying drawing and haftones.



Lathe Carrying the Commutator Slotter

The idea was to develop something simple and efficient, readily fitted up in the ordinary repair shop at small cost. The device shown consists of a slide rest which carries a small swinging frame and saw arbor fitted with a circular saw. The frame is carried on a taper pin which is similar to the apron of an ordinary planer or shaper. This arrangement provides a simple means of adjustment for commutators of different diameters and also allows the saw to be thrown back out of the way when handling the armature. A handle is fastened to the swinging frame as shown, and




Swinging Frame for Commutator Slotter

the saw is drawn through the commutator. It was found advisable to use a coiled spring for holding the saw down to the mica. This spring is fastened to a staple in the floor and hooked over the handle. The spring can be released and the frame thrown back in an instant.

In the present case this device was fastened to a banding lathe, also of the writer's design. This slotter has been in constant use for the past three years, and has proved very satisfactory and efficient. An armature such as the GE-57, 80 and 1000 and the Westinghouse No. 56 can be readily undercut in from ten to fifteen minutes.

Commutator Slotter Applied

After the slotting feature was perfected the machine was arranged for revolving the armature at high speed, so that the burrs thrown up by the saw could be removed and the commutator polished at one operation. Two side screws provide for the adjustment of the slide rest for commutators that are not in exact alignment with the shaft, but such adjustment is seldom required. As the armature is held very free on the centers, the saw follows the cut without trouble. This slotting rig can be readily attached to any lathe and has no expensive adjustments or heavy moving parts.

# Brooklyn Report on the Equipment and Constructional Features of Prepayment Cars

A Digest of the Elaborate Report on Prepayment Cars in Thirteen Cities Made to the Brooklyn Rapid Transit System by Its Mechanical Department—Plans and Statistical Data of All Cars Described Are Included

An extended study of the latest types of prepayment cars used in thirteen large American cities has recently been made for the Brooklyn Rapid Transit System by the mechanical department, according to lines laid down by the management of the company. The information thus collected, together with numerous drawings and photographs, was then mimeographed and bound in a book 11¼ in. x 8¾ in. in size for submission to the management and other officers of the company whose views, from either the transportation or the mechanical standpoint, would be of value. The purpose in collecting these data was to determine what experiences the users of prepayment cars had had with different forms of construction and types of equipment. Fare collection problems are touched but slightly in this report because a parallel investigation on this subject has been made by experts of the transportation department.

There are two important reasons why the Brooklyn Rapid Transit System has not yet installed prepayment cars. One is that the cars in use, especially those of the accelerator type, cannot be converted to vestibuled prepayment service except at prohibitive cost. The second reason is purely an operating one, namely that during the rush hours most of the surface cars are fully loaded at the New York end of the Brooklyn Bridge, where no facilities exist for any form of fare prepayment.

The amount of passenger traffic on the Brooklyn lines has now reached the point where a large number of new surface cars is a necessity, yet improvements in car construction have occurred so rapidly within the last two or three years that the company has felt that it would be wise to study car developments in other cities before deciding just what features the new cars should embody. Should a prepayment design be adopted, it would probably be applied for the complete run to all short-trip and crosstown cars but not on the cars which cross the Brooklyn Bridge until they have left the bridge structure. Passengers bound for Brooklyn on cars which cross the Williamsburg Bridge are already segregated on terminal station platforms according to route, so that prepayment there may be feasible with the initial load.

The study of prepayment cars as hereinafter described has also been supplemented by an investigation of low-floor, center-entrance cars. As a result, the company is preparing to try the center-entrance car described in the Electric Railway Journal of March 30, 1912.

The original Brooklyn report on prepayment cars is far more elaborate than the following abstracts because practically all of the cars mentioned have already been described in previous issues of the Electric Railway Journal, as indicated by the reference dates. The abstracts, therefore, are limited chiefly to certain special features of construction and methods of operation as they appealed to the company's engineer of car equipment. The illustrations likewise have been confined to the plans of cars and to special constructional features. It has also been found possible to present in convenient tabular form most of the information on dimensions, weights, equipment, seating arrangement, step heights, etc.

Among previous descriptions in the Electric Railway Journal relating to the cars hereinafter described are the following:

United Railways & Electric Company of Baltimore, April 8, 1911.
Boston Elevated Railway, April 1, 1911.
Capital Traction Company, Washington, Nov. 12, 1910.
Chicago City Railway, Sept. 28, 1907, and Feb. 22, 1908.
Chicago Railways, Nov. 7, 1908, Aug. 28, 1909, and Oct. 7, 1911.
Cincinnati Traction Company, Sept. 23, 1911.
Cleveland Railways, Oct. 24, 1908.
Milwaukee Electric Railway & Light Company, April 8, 1911.
New York Railways, Dec. 5, 1908.
Public Service Railway of New Jersey, Oct. 7, 1911.
Third Avenue Railway, New York, Jan. 23, 1910.
Philadelphia Rapid Transit Company, Oct. 21, 1911, and June 8, 1912.
Pittsburgh Railways, Jan. 20, 1912.
United Railways of St. Louis, March 13, 1909.

The arch-roof cars of the Chicago Railways were described so extensively in the issue of Oct. 7, 1911, that no description is given hereinafter except for the plan and tabular data.

### UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

The standard pay-as-you-enter, double-end car of the United Railways & Electric Company of Baltimore is of Brill semi-convertible type. The platforms are open and have portable vestibules with sliding center sash. A stanchion from the bonnet bow to the platform floor divides the entrance and exit. A railing is provided from the stanchion around the fare box and thence to the car bulkhead. There is also a stanchion at the vestibule corner posts which serves as a grab handle. The inwardly swinging hinged door at each end of the body is for exit from the rear, while the double sliding door is for both rear entrance and front exit.

The underframe is of wood diagonally braced. The side sills are reinforced with 5/16-in. x 16½-in. steel plates. Steel is used for reinforcement only. The posts are mortised into the sills and fastened with strap bolts. A malleable-iron bracket is bolted to the top of each post as well as to the body plate and letterboard. The platforms are supported upon four channel-iron knees with I-beam separators built up to form a truss. The inside platform knees are of 5-in. channels with a gusset plate between and riveted to a 10-in. channel iron end sill. The steps are stationary. Pantograph platform gates are used at all corners to close the sides of the platforms not in use. The interior is of cherry natural finish and the headlining of agasote. The use of pressed steel instead of malleable iron for seat framing saved 25 lb. per transverse seat.

The main cables are placed in a transite-lined box inside the car body. Conduits which are provided under the platform lead to junction boxes under the controllers. Heater wiring is also provided in conduit, although no heaters are used at present on city cars. The light wiring is run in wooden moldings.

A register is installed at each end of the car for use in connection with a Johnson cash registering fare box. The registers are for cash fares only and are so arranged that the one on the front bulkhead is always used. Both registers are operated by the same rod mechanism, the one on the rear end of the car being always disconnected. The officials of the company seem to be unanimous that the pay-as-you-enter car is the best type for their service. Their preference is based on the assumption that if side platform doors were used slower movement would result, thereby necessitating more cars. A count taken during the evening rush hour in the business district indicated that the average rate of loading prepayment cars was about 1¾ seconds per passenger.

BOSTON ELEVATED RAILWAY

The last 100 surface cars bought by the Boston Elevated Railway are of the pay-within, easy-access, semi-convertible type. The first fifty were placed in service during July, 1911, and gave such satisfaction that the second fifty were duplicates without any important changes. Seventy-five more have lately been ordered. No folding platform seats are used, as all four doors are needed at certain places. The side platform doors are double two-leaf hinged doors swinging outward from the body and the vestibule corner post. A vertical pipe stanchion divides the entrance and exit on the rear platform. On the front end the entire space on both sides of the stanchion is used for exit. The motorman controls the front doors and the conductor the rear doors. The doors are hand-operated and have rubber strikers. The extra-wide center vestibule window gives the motorman a wide angle of view unobstructed by vestibule posts.

The underframing and end framing are of steel. To give stability to the car and take care of strains due to side and endwise sway, the corner posts and end bulkhead framing are composed of lattice steel work which extends from side to side of the car to form an arch over the body end opening. This provides a light yet stiff construction and allows the use of very light intermediate side posts. Four steel trusses are used between the bulkheads to support the roof. This permits a very light monitor roof and adds strength and stiffness to the clerestory which are not obtained by the usual type of construction. The trusses are exposed in the top of the car, but are not very conspicuous, and besides they are utilized for the attachment of hand strap poles, brackets and bell and register devices. No headlining is used in the upper deck so the wooden carlines and the underside of roof boards are exposed. The lower deck has a grooved agasote lining which forms the backing for advertising signs.

A special feature of the vestibule framing is the reinforcement of the posts on the inside with ½-in. x 1½-in. bar iron, bolted to the crown pieces and the vestibule hood. These serve to take up the shock of slight collisions and protect the motorman against splintering posts. Wherever practicable bronze hardware has been eliminated in favor of painted malleable iron.

The main cables are made up without any splicing whatsoever and seven-strand wires are used. The several wires composing a cable are taped together to hold them in shape. They are then covered with rubberoid, taped and painted with smokestack black paint. The main cable is supported on grooved wooden timbers fastened in an accessible place under the car. It has been found that this method of supporting cables is preferable to conduits, as the latter have given considerable trouble from grounding. An accompanying illustration shows a section of the cable in the grooved wooden molding and the method of support. The Westinghouse knuckle-joint connectors are used at the motor leads and are clamped tightly together in a grooved wooden clamp as shown in the same illustration. The conduit for light wiring is made of pressed steel and special outlet boxes are provided for the lamps.

Cash fares and transfers are registered separately on registers located on opposite ends of the car. At present passengers are required to drop cash fares into a dummy fare box. This box serves only as a receptacle so that the money is available for the conductor as soon as the deposit is made. The object of this box is to get the passengers accustomed to depositing fare pending the adoption of a permanent fare box.

One of the hard conditions with which the Boston company has to deal in the operation of pay-within cars on the Jamaica Plain Dudley Street line is the transportation of employees from the Plant shoe factory, where thousands of employees leave work at practically the same time. The following statement shows the result of a count of passengers made at this point on the evening of Feb. 2, 1912, in order to determine the average time per passenger required to load:

| Time in Seconds to Board | Number of Passengers Boarding Car | Number of Passengers in Car After Boarding | Time |
|---|---|---|---|
| 9 | 6 | 16 | 5:27 p. m. |
| 109 | 68 | 82 | 5:30 p. m. |
| 111 | 72 | 76 | 5:33 p. m. |
| 115 | 73 | 88 | 5:37 p. m. |
| 68 | 46 | 85 | 5:40 p. m. |
| 111 | 73 | 107 | 5:40 p. m. |
| 31* | 14 | 66 | 5:46 p. m. |
| 554 | 352 | | |

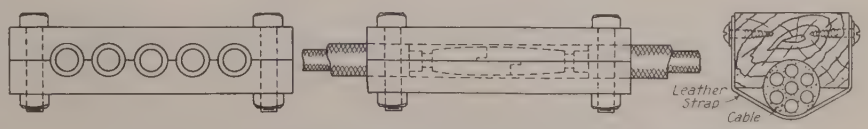
Average time to board, per passenger, 1.57 seconds.

*Passengers were slow in arriving and car was somewhat held up on this account.

At other congested points where cars are operated through the subway fares are prepaid so that no time is lost in boarding the cars. At such places all of the doors are opened in order to allow passengers to board and alight quickly.

CHICAGO CITY RAILWAY

The standard car of the Chicago City Railway is of the double-end, pay-as-you-enter type. The last fifty cars are somewhat larger and of lighter construction than their predecessors. Their platforms are 6 ft. 1½ in. long instead of 7 ft. measured at the center from the inside of the vestibule panel to the car body. The clear entrance of the new cars is 2 ft. 8 in. instead of 2 ft. 10 in. The new cars also differ in having a sliding door in the bulkhead at the entrance side instead of a swinging door, which was found objectionable on crowded cars. A sliding door is provided at the front exit and on the forward portion of the platform. This door is kept closed on the rear platform. The steps are stationary in operation, but when the steps on the side not in use are folded up those on the other side are always down. The platform railings can be arranged to make suitable inclosures for the motorman and conductor.




**Boston—Wooden Clamp for Knuckle Joint Connector and Method of Supporting Cable**

The underframe is built up of steel, the side sills being composed of 10-in. 15-lb. channels reinforced by angles for the full length top and bottom. The side sills are reinforced at each bolster by an upper truss of 2½-in. x 7/16-in. bar steel, having 2-in. x 2-in. x 7/16-in. angle struts at each bolster. The end sills are 10-in. 15-lb. Between the bolsters there are four cross floor members of 5-in. 6.5-lb. channels which are attached to the side sill channels by connection angles. The bottom framing is diagonally braced by two 2½-in. x 2½-in. x ⅜-in. angles passing under the cross channels and connected to the side sill channels by angle gusset plates. The bumpers are of 7-in. channels connected to Z-bar platform knees by connection angles. The platforms are diagonally braced by 2½-in. x 2½-in. x ⅜-in. angles. The body bolsters are of cast steel with ends gibbed down under the side sills and bolted thereto. The roof extends the full length of the car body and is supported by continuous ⅜-in. x 1½-in. section steel carlines at each post.

Each end of the car body is fitted with two sliding doors arranged to slide by each other into pockets. The inside finish of the cars is cherry, stained and rubbed to a dull finish with natural-finish birch veneer headlining.

Four air sanders are used, namely, Nichols-Lintern, Ohio Brass, Electric Service Supplies Company and Wyoming. The last has been used in test only but has been found

satisfactory. In the Wyoming sander the freezing of sand is partly overcome by using the vacuum principle to prevent moisture from coming into contact with the sand. Both rails are sanded from boxes placed in each corner of the car. These boxes are lined with No. 24 galvanized iron and are provided with Nichols-Lintern sand traps and 1¼-in. iron sand spouts.

The company has been trying various ventilators to obtain one which will not require a motor to exhaust the air. The Wilson and mushroom types, which are arranged only to exhaust the air, have proved the most satisfactory. Tests showed that air does not blow into the car through these ventilators. They are so designed that the air is exhausted either from the motion of the car or through the action of the wind blowing against the ventilator from any direction. Various trials showed an exhaustion of 29,000 cu. ft. to 36,000 cu. ft. per hour, thus meeting the legal requirements. These tests were made with eight ventilators in the car body with an intake area of 477 sq. in. in the floor under the heaters and an exhaust area of 432 sq. in. The company also experimented with two ventilators in each vestibule with a total exhaust area of 78 sq. in. for each vestibule. On these tests an average of 6000 cu. ft. of air was exhausted per hour from the two vestibules.

The cables which connect the controllers, motors and resistances are installed in sheraduct conduit. The light and heater wiring is installed in Stirling flexible steel conduit. The latter conduit is also used for push-button wiring except in the car posts where the wiring is run in grooves. Junction boxes are used under the controllers and connection boxes at the motors.

### CINCINNATI TRACTION COMPANY

The latest cars of the Cincinnati Traction Company are of the pay-within type. Fifty are in operation and fifty under construction. They are single-ended with folding doors at one side of the car only. A feature of the door arrangement is the use of glass in the lower panels to give the conductor a better view of the street from his position. The steps are stationary but the doors are located flush with the outside edge of the steps and swing inward, so permitting simple mechanism and easy operation. The exit and entrance doors on the rear platform are operated independently. Johnson registering fare boxes are used.

The body construction is of steel plate, girder type, up to the window sills, with angle iron riveted to the bottom of the plate which forms the side sills, to which cross members of commercial shapes are attached. The side plates are 5/32 in. thick x 32 in. wide. By the use of shallow cross bearers and the raising of the side sill the trucks can be turned around completely without interfering with the car sills or floor members. The monitor roof has steel carlines at each side post with one wooden rafter spaced between each steel carline.

Sand boxes are provided for both the forward and rear truck, sanding both rails by means of independent mechanisms. This arrangement is due to heavy grades. The sand boxes are controlled by foot plungers and are of the usual sliding valve type.

Operation of these pay-within cars began in July, 1911. Previous to that time the company had operated fifty pay-as-you-enter cars for about three years. Experience in Cincinnati is that the pay-within type is more desirable on account of the decrease in accidents due to boarding and alighting and to the better protection afforded to the conductor.

### CLEVELAND RAILWAYS

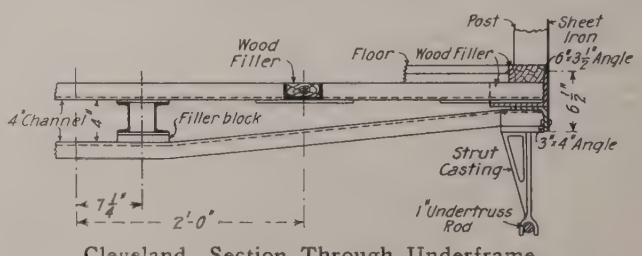
The Cleveland Railways operate 230 new pay-as-you-enter and 622 pay-within cars, all single-end. The pay-within construction was used for rebuilding old equipment on account of cost in making the change. In the pay-as-you-enter car one side of the rear platform is open and is divided by a stanchion which serves as a grab handle as well as the division between the entrance and exit. No railings are used on the rear platforms except as a protection around the fare box. One of the most striking features is the spacious platform. While this may be considered as waste space during ordinary traffic, it reduces boarding delays to a minimum during rush hours because several passengers can get on the platform at one time and stand in line to deposit their fares after the car is in motion. The motorman has a permanent cab with sliding door on the front platform so that he is entirely inclosed when operating the car. This is a desirable feature where there are no bulkhead doors as in case of stormy weather it is sometimes necessary to operate with the vestibule sash partly open. Another advantage is that the passengers cannot talk to the motorman or crowd him. The single-end car is, of course, particularly adapted to this arrangement because the cab can be built as a permanent part of the car, while on double-end cars it would have to be built with folding doors.

The following table shows the result of counts taken of passengers boarding during the evening rush hour and indicates the total and average time in seconds:

| Pay-As-You-Enter Cars | | Pay-Within Cars | |
|---|---|---|---|
| Number of Passengers | Time in Seconds | Number of Passengers | Time in Seconds |
| 5 | 6 | 17 | 24 |
| 10 | 18 | 20 | 35 |
| 23 | 31 | 22 | 28 |
| 7 | 13 | 7 | 8 |
| 5 | 6 | 12 | 21 |
| 14 | 22 | 12 | 22 |
| | | 9 | 11 |
| — | — | — | — |
| 64 | 96 | 99 | 149 |

Average, 1.47 seconds per passenger. Average, 1.51 seconds per passenger.

A slight difference appears in favor of the pay-as-you-enter type. Count was taken only on cars that came to a standstill, and it was noted that passengers frequently would




**Cleveland—Section Through Underframe**

board such cars while in motion. If the latter practice is taken into consideration, the difference in favor of the pay-as-you-enter car would be still greater. However, for that very reason it offers more chance for platform accidents than pay-within cars.

The light, yet substantial, underframe is the principal constructional feature in the Cleveland car. The side sills are of 3⅝-in. x 6-in. long-leaf yellow pine, reinforced with two bolted angles. The center sills are of box girder construction connected to the end sills by means of a casting which is so arranged that a continuous girder is provided from end to end of the car. The cross members are composed of two 4-in. 5.25 lb. channels; top channel straight with flanges upward and filled with wood, to which the floor is fastened, and the bottom channel placed with the flanges down bent to form a truss to give a light but stiff support for the floor. Gusset plates 3/16 in. thick are used to join longitudinal and transverse members, and a further bracing of the underframe is obtained by using two ⅜-in. x 3-in. plates which are fastened to the side sill angles, extending diagonally from a point about 30 in. from each bolster and crossing in the center of the car. The superstructure is sheathed on the outside below the rail with No. 14 sheet steel. The inside finish of all cars is of slightly stained cherry. Both agasote and Gardner artificial lumber have been used for headlining with satisfactory results.

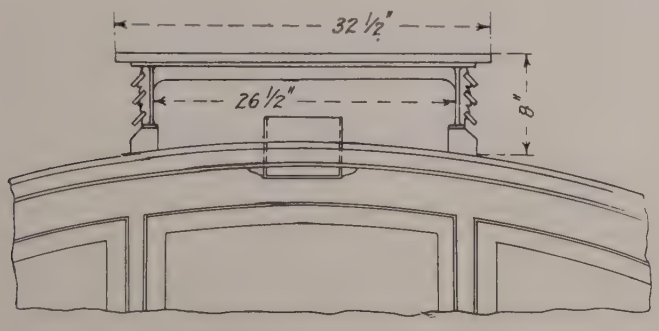
A sample car with a single arch roof and an auxiliary ventilator deck supported by steel brackets has been built as

illustrated. From the outside this sample car looks like an ordinary monitor roof car, while from the inside there is no indication of a clerestory. Another interesting feature of this sample car is the substitution for hand straps of a horizontal bar placed over the longitudinal seats at the end of the car.

The cars are heated by the Peter Smith forced draft heater, which takes air from the outside and exhausts it into the car through asbestos-lined ducts which have openings placed at the side of the car near the floor line. On longitudinal seat cars the ducts are placed under the seats with openings in the seat panels as for electric heaters. Officials of the company estimate that there is an annual saving of $24.78 per car over electric heaters of the same efficiency, with the added advantage of a positive ventilating system.

The Cleveland Company uses a home-made non-registering fare box which serves merely as a receptacle for cash and tickets. The collections are registered separately in the usual manner and are not available to the conductor after being placed in the box.

A single car equipped for pay-as-you-leave operation was described in the ELECTRIC RAILWAY JOURNAL for April 27, 1912. This car is of the same appearance as the pay-as-you-enter type and has but these points of difference: entrance at front door only, exit at rear only; rear platform with one door opening, conductor's position and fare box being at the right of passenger leaving car; a railing to divide the platform from side to side, smoking being permitted back of same. Both doors are equipped with folding step and manual control. In operation the car stops with the front




**Cleveland—Dummy Monitor**

door instead of the rear door opposite the passengers who are waiting to board. The motorman operates the front door and the passenger steps directly into the car without delay, as fare is not collected until he passes the conductor in leaving the car.

DETROIT UNITED RAILWAY

The latest cars of the Detroit United Railway are of the single-end, pay-within, closed type. The construction of the body is of the usual convex and concave type with monitor roof and wooden side panels. The headlining of the last fifty cars is of agasote. The rear platform is 6 ft. long from the end of the body to the inside of the vestibule finish. It has two sets of independently operated two-leaf swinging doors—one for the entrance and one for the exit side. The railing which divides the entrance and exit extends to the inside of the body and partly around the conductor's position. The doors are hand-operated by the conductor. The bulkheads at both ends are open almost the full width of the car, and a pipe stanchion is provided on each side of the bulkheads to form hand-holds for the passengers as they enter or leave.

The forward platform has a partition built back of the motorman which partially incloses him. A railing and chain complete the inclosure. This is a recent change from the practice of having a complete cab with sliding door. The railway desired to simplify the construction on the front platform owing to the high cost of maintaining cabinet work which gets out of order due to slight causes. The bell cord is hung in the center of the car. The register cord passes through brackets attached to the deck sill.

The railway officials are very much pleased with experiments made with the "Golden Glow" headlight reflector furnished by L. Parkinson, Detroit. These reflectors are of glass with a brilliant silvering and have a very strong penetrative power. It is asserted that they can throw light through a heavy fog.

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

The latest Milwaukee cars are of the double-end prepayment type with sliding doors in the bulkhead and two-leaf folding doors, swinging outward, at the exit side of both platforms.

A composite construction is used with steel side plates 3/16 in. thick up to the window stool. A 4-in. x 4½-in. x ½-in. "T" is used for the side sill riveted to the steel side plate. Two channel-iron center sills spaced 6 13/16 in. apart run the full length of the car body. The cross members are of 4-in. special channels laid on the No. 14 sheet steel plates which form the foundation for karbolith flooring. The inside trim is of quartered oak with a light golden finish.

The platforms are of the usual drop type with built-up side bearers of 3/16-in. steel plate with top and bottom reinforcement of 2-in. x 2-in. x ¼-in. angles. The round diagonal tie bars ½ in. thick used to brace the platforms extend from the corner of the vestibule to the corner of the car body, crossing at the center.

The plan of this car shows the platform arrangement. The swinging door at the entrance is kept in the open position when used as the rear platform and closed when used on the front end of the car. The swinging doors on both sides of the platform are hand-operated.

An interesting feature of the electrical equipment is the use of separate fuses for each armature circuit. These fuses are placed in one box under the car body. A main motor fuse and main cut-out switch are also used but no circuit breakers.

The railway officials believe that this car is somewhat heavier than necessary for city service, and also that side doors on the platforms would be more satisfactory in reducing platform accidents. Several of the older cars which have been altered for side doors have bottom panels of glass. The glass construction seems very desirable where side vestibule doors are used, as the conductor gets a better view of passengers leaving the car and of children on the street desiring to board the car.

REBUILT PREPAYMENT CARS IN MILWAUKEE

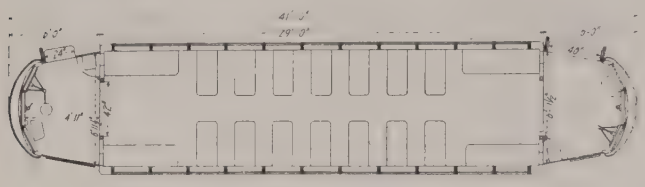
*(Contributed by R. B. Stearns, Assistant General Manager Milwaukee Electric Railway & Light Company)*

The latest type of prepayment city cars which are now being put into service in Milwaukee consist of the old standard, double-end wooden body cars, which have been rebuilt and which now include a number of improvements and additional features. The most noticeable change consists in tearing out the bulkhead partitions and bulkhead doors and the fitting up of the platform with outside folding entrance and exit doors. The entrance doors include two double-leaf sections which, when fully opened, furnish a clear passageway of approximately 40 in. The exit doors consist of one double-leaf section, the hinge shaft of which is placed as near as possible to the right-hand corner post, the full opening in this case being approximately 24 in. At the entrance from the platform into the car body proper there is a partition on each side, 27 in. high, with a clearance between the same of 42 in. This extends out beyond the seats about 6 in., thus furnishing to the passengers a very comfortable arm rest and also protecting them from the passengers who are entering or leaving the car. From the outside of this partition to the top of the car 1⅜-in. brass standards are placed to afford convenient grab handles.

The lower panels in both the exit and entrance doors are equipped with transparent wired glass, which allows the con-

ductor to observe, without opening the door, whether children wish to board the car. This construction also permits the motorman to be certain that people are absolutely clear of the car and that no portion of their clothing is caught in the folding door or step. As the platforms on these cars were only 5 ft. inside measurement, it was thought that some delay might result, but actual operation has shown that this is true in exceptional cases only. Accordingly the size of the platforms has not been increased.

The conductor's position is in the corner of the platform, between the car body and the exit door. In this position he



Milwaukee—Rebuilt Prepayment Car

is facing the entrance door and is accordingly in the best possible position to observe the boarding of passengers, particularly as a small elevated platform is placed at this point. The fare box is mounted upon the brass standard at the left of the conductor.

The speedy and safe operation of the cars has been greatly facilitated, owing to the fact that a signal light arrangement has been installed upon the car to notify the motorman automatically when the rear entrance doors are closed. This feature is of still greater value for the operation of trailers.

Several other details have been added, such as a positive method of opening and retaining in a fixed position the deck sashes. These are operated in groups of four by a horizontal torsion rod. Curtains also have been provided as a shield to prevent the direct light from the inside of the car body from blinding the motorman. It is expected that during the coming winter storm sash will be installed to overcome the trouble due to the collection of frost on the vestibule windows.

It was not thought advisable to arrange compartments for the accommodation of smokers, for by so doing many of the advantages in the present car would not be obtainable. Instead of causing trouble, this course has met with the approval of the riding public and is receiving its general support.

PUBLIC SERVICE RAILWAY OF NEW JERSEY

The Public Service Railway Company operates pay-as-you-enter, pay-within and pay-on-platform cars. The pay-within type, which is still used in rebuilding equipment, has the bulkhead entirely removed and doors are used at the side of the platforms. The pay-on-the-platform type, adopted for new equipment, has double sliding doors in the bulkheads and two-leaf hinged doors at the side of the platform.

Twenty-six double-entrance pay-on-platform cars are being built at the Plank Roads shops of the railway and fifty by the Cincinnati Car Company. The 4-in. x 7¾-in. yellow pine side sills are reinforced by a ¼-in. x 18-in. steel plate which extends around the corner of the body to the end door posts. This plate serves as the lower side panel. For city service the advantage of having a plate of this thickness for the outside sheathing is quite apparent because wooden panels or thin steel sheathing are not sufficient protection against scraping from other vehicles. No center sills are used, but the floor is carried on bearers of yellow pine which extend between the side sills. The end sills are of 5¼-in. x 6⅞-in. white oak mortised into the side sills and stiffened with ½-in. x 6-in. connection angles. The bolsters are of cast steel.

An important feature of the underframe is the method of bracing. A 3½-in. x 3-in. x ⅜-in. angle is bolted to the end sill, extending a distance of 38 in. in the center thereof, and from a point 19 in. from each side of the center line the angle is bent backward at an inclination of 45 deg. to the inside face of the side sill, against which it has a bearing of 25½ in. and is securely bolted thereto. The platforms are of the drop type supported by angle-iron knees. The center bearers are carried back to the bolster to which they are bolted. Side arms are carried back for 5 ft. and attached to the inside face of the side sills under the brace angle.

The monitor roof has steel reinforced carlines at each post and two wooden intermediate carlines between the posts. Agasote is used for both the upper and lower deck ceilings.

The end bulkhead doors slide into pockets and the corner posts are divided to allow the doors to slide to the side plate of the car, thus providing a clear opening of 48 in. in the bulkhead with doors open. A platform stanchion with a railing around the fare box divides the entrance and exit. The opening between the body corner post and vestibule post, which is 61 in. wide, has double two-leaf doors, swinging inward, the one on the entrance side folding against the controller and the one on the exit side against the end of the car body. The steps at the sides of the platform are stationary. The interior finish is of cherry, slightly stained to provide a uniform shade with the varnish rubbed to a dull finish.

A recent test conducted by the company on five lines showed that the average time per passenger interchange was as follows for the types of cars named: 1.73 seconds, double-entrance prepayment cars, with longitudinal seats; 1.82 seconds, ordinary prepayment cars, with longitudinal seats, and 1.94 seconds for cross-seat cars. These figures are based on a total of 282 stops and the interchange of 644 departing and 979 entering passengers.

NEW YORK RAILWAYS COMPANY

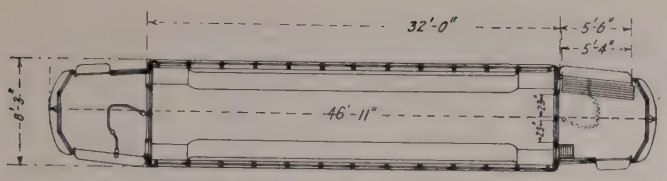
The Metropolitan Street Railway, now the New York Railways Company, placed 155 double-truck pay-as-you-enter cars in service late in 1907 and early in 1908. These cars had four GE-80 40-hp motors and Brill No. 27-9-E-1 short wheelbase trucks and weighed complete 47,870 lb. Longitudinal seats were provided, giving a seating capacity of thirty-six, bringing the weight per seat up to 1330 lb. The operation of these cars was successful, but it was felt that the added weight compared with the lighter standard two-motor cars equipped with maximum traction trucks was objectionable because of greater current consumption and increased maintenance. The result of a study made by Ford, Bacon & Davis was the adoption of a two-motor, pay-as-you-enter car with maximum traction trucks as hereinafter described.

The cars known as the 1908 type are of double-end design operated with one side open and stationary steps. A stanchion divides the entrance and exit, giving 38 in. on the entrance side and 24½ in. on the exit side. On the forward end of the car this opening is closed with a two-leaf hinged door. At the forward exit a sliding door is used which is hand-operated by the motorman.

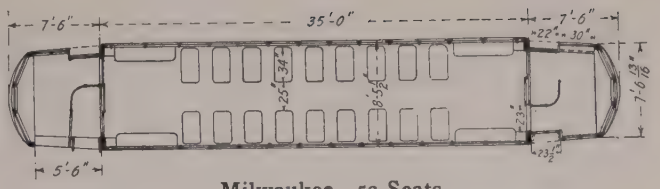
A departure from the original pay-as-you-enter plan was made in the arrangement of the bulkheads. Instead of having the doors slide into pockets in the center of the bulkhead, they slide into side pockets. A dividing post in the center of the opening serves to divide incoming and outgoing passengers. The table shows that in seating capacity and weight the 1908 car is an improvement over its predecessor.

The car body is of wood throughout but with reinforced side sills. The side sills and center sills are of long yellow pine and the end sills of oak. Yellow pine is also used for the body and deck plates and the remainder of the framing is of white ash. The inside finish is of silver white ash with birch veneer headlining, all natural finish.

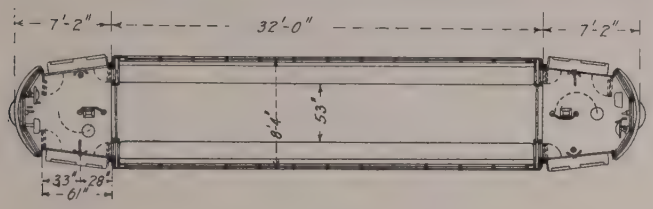
A departure from the usual practice in the installation of the electrical equipment was the placing of circuit breakers



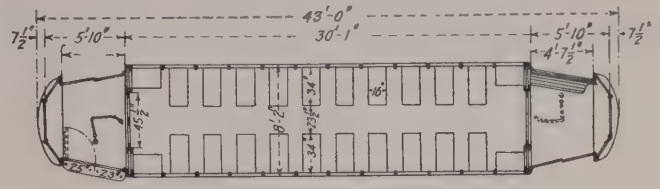

New York Railways—47 Seats



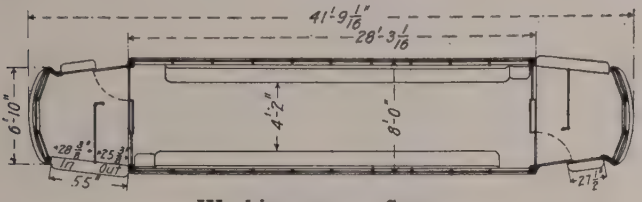

Milwaukee—52 Seats



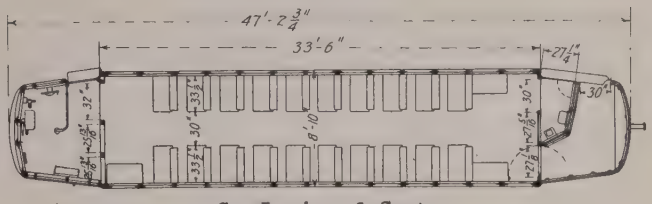

Public Service—42 Seats



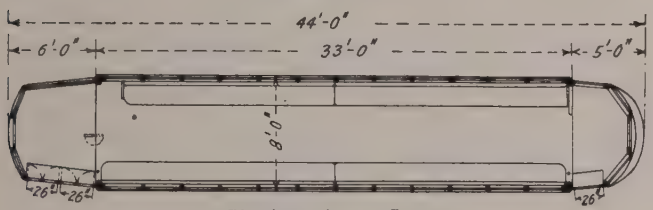

Third Avenue—51 Seats



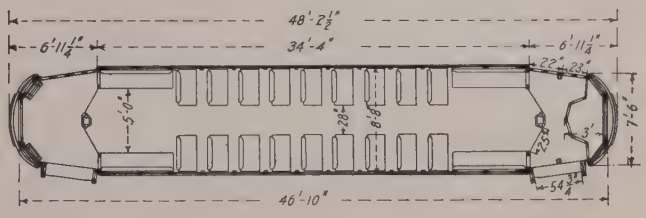

Washington—33 Seats



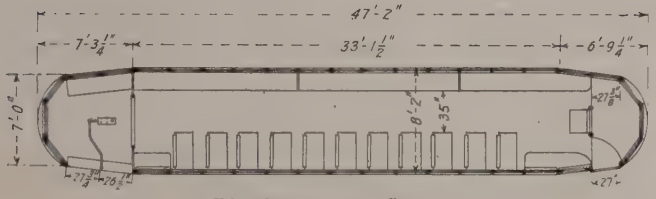

St. Louis—46 Seats



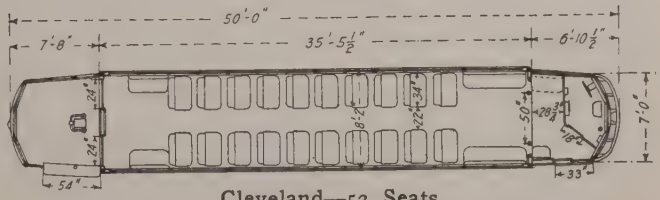

Cincinnati—33 Seats



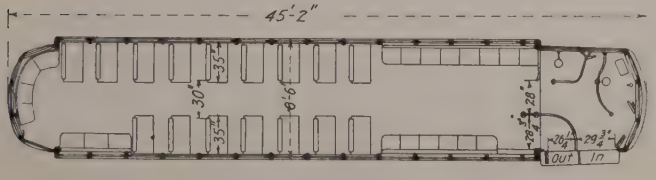

Boston—52 Seats



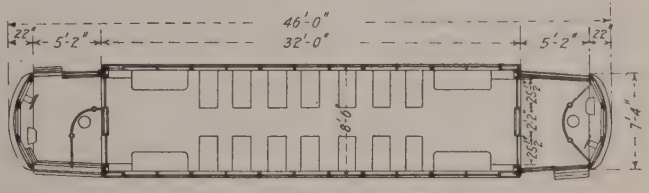

Pittsburgh—56 Seats



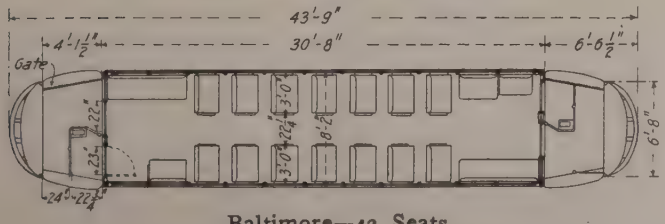

Cleveland—52 Seats



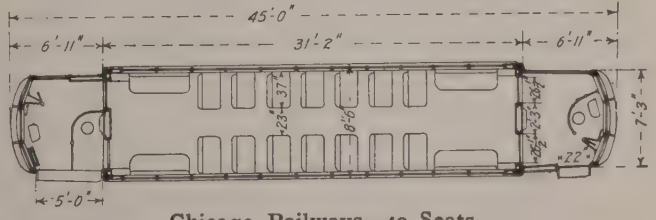

Philadelphia—53 Seats



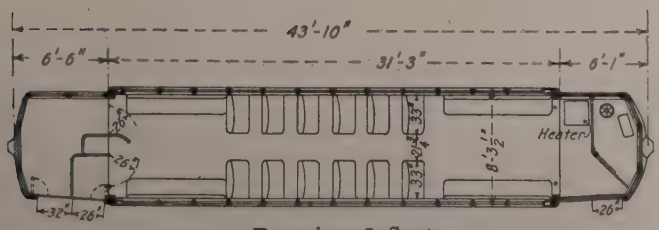

Chicago City—40 Seats



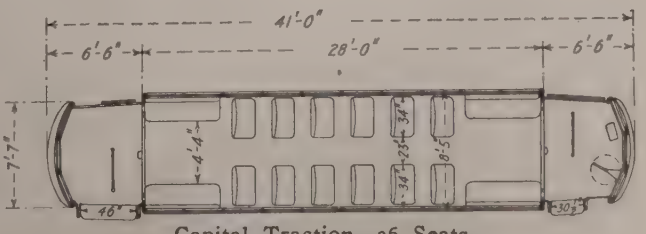

Baltimore—42 Seats




Chicago Railways—40 Seats




Detroit—48 Seats




Capital Traction—36 Seats

under the car floor since the hood cut-out switches are placed in the top of the vestibules. The main motor cables are run in a box lined with asbestos board placed under the longitudinal seats with metal conduit provided under the platform and where exposed under the car floor. The light circuits are run in wooden moldings and the heater wires in metal conduit. The headlight provided in the center of the vestibule pocket over the center vestibule sash consists of an asbestos-lined box fitted with semaphore lens and containing an incandescent lamp.

A register is located at each end of the car in the center over the doors and connected with a foot register-operating device, which, however, can also be operated by hand. The single register used at one time is the one on the rear end of the car. Only cash fares are registered and a fare box is also used, the principal type being the Johnson.

Since 125 cars of this type were placed in service early in 1909, further studies have been made with a view toward increasing the seating capacity and reducing the weight. A sample car of the same general dimensions as the 1908 type but arranged with cross seats and straight sides was built in this connection. This car measures 8 ft. 3 in. over the sides and has a total seating capacity of fifty-three, of which five are on platform folding seats. The total weight is 36,000 lb., or 680 lb. per passenger. It was intended to purchase 400 of these cross-seat cars to replace single-truck cars, but these plans were abandoned by the new management pending further experiments. With this end in view a stepless center-entrance car of the type described in the Electric Railway Journal of March 16 and April 20 was placed on trial and with such satisfactory results that the company will install 150 more as soon as they can be built.

### THIRD AVENUE RAILWAY

The standard car of the Third Avenue Railway, New York, is of the pay-as-you-enter, double-end convertible type. The body is constructed with a side plate 9/16 in. thick x 14 in. deep, bolted to a 4¾-in. x 7-in. yellow pine sill. The floor bearers are of wood reinforced by ⅜-in. x 5-in. steel plates. The bolsters are of the built-up type with a top member consisting of ¾-in. x 9-in. steel plate and a ⅞-in. x 9-in. bottom plate. The underside of the trap doors is lined with galvanized sheet iron.

The standard pay-as-you-enter platform arrangement is provided, and cars are operated with one side of the rear platform open and steps down. A stanchion from the platform floor to the hood divides the entrance and exit, a clear width of 25 in. being provided for the former and 23 in. for the latter.

Sliding doors of the New York Railways "1908" type are located in the center of the bulkhead. No dividing post is used between the doors on the Third Avenue cars, however, but a dividing stanchion is located about 6 in. from the bulkhead. This stanchion has been found objectionable and arrangements are being made for its removal. A sliding-door arrangement to open by tripping a latch is provided for the exit on the front platform. This door is under the motorman's control, the closing being effected by stepping on a pedal. It is operated in conjunction with a folding step. The Johnson fare box is used throughout.

### PHILADELPHIA RAPID TRANSIT COMPANY

The near-side prepayment car of the Philadelphia Rapid Transit Company, as the name suggests, is intended for operation where stops are made on the near side of the street. The conductor is placed on the front platform behind the dividing rail. Both the entrance and exit are on this platform, the entrance being on the forward side and the exit near the end of the car body. The first lot of near-side cars numbered fifty, and 500 to 800 more are under construction or subject to order. The latter cars embody numerous minor improvements, including the lower steps obtained by sloping the floor from the bolster, increasing the length of the cross seats from 34 11/16 in. to 35 in., better accessibility of grab handles, reduction of weight from 38,000 lb. to 36,000 lb., etc. The cars are of the single-arch roof type with steel underframe and wooden superstructure. While exit is ordinarily provided for on the forward end only, an emergency door located at the rear can be opened by manually operated levers by the conductor from the forward end of the car. Birch headlining in natural finish is used. The inside trim is of cherry.

### PITTSBURGH RAILWAYS

The standard motor car of the Pittsburgh Railways is arranged for single-end operation with entrance at the rear platform only. Exit is provided both at the rear and front platforms, the latter having two pairs of doors placed at the side operated independently or simultaneously as required and so arranged that when both doors are opened a partition is formed to divide the entrance from the exit. A sliding door operated by the motorman is used at the exit on the front platform.

One of the principal features is the method employed to inclose the steps when the car is in motion. The steps to both the front and rear platforms are stationary, the doors extending down to them and arranged so that when closed they will be flush with the outside edge and thus entirely inclose the steps. The rear platform doors are hand-operated, while the exit door controlled by the motorman is operated pneumatically. The air pressure is used only to open the door, the closing being effected by a spiral spring which is compressed when the door is opened. The rear platform doors close with a swiveling motion and with a passenger on the step would close behind him and tend to assist him in getting on the car. It is not possible, however, entirely to close the doors with a passenger remaining on the step as the power obtainable with the door-controlling handle is not enough to overcome an obstruction against the doors. The doors in the open position are within the side clearance of the car so that any obstruction passed by the car would not interfere with the doors if left open. This is an advantage even if it is not intended to operate with open doors in service, as it facilitates movement in yards and carhouses.

An interesting feature of the Pittsburgh cars is the resistances. These are of the Westinghouse three-point suspension grid type, three frames, using four different grids. This type has been adopted as standard to replace a large number of different types and combinations of resistances on the older cars. Although many combinations are required, only three groups of frames are used, the various combinations being obtained merely by varying the connections and by the shunting of grids, as conditions require. The main fuses are of the copper ribbon type. The main cables are composed of Roebling four-conductor cables run in pairs, each inclosed in 1½-in. conduit, the outside diameter of each cable being 1⅜ in., which fits snugly into the conduit.

The officials of the Pittsburgh company are very enthusiastic about the use of steel for car construction. The first cars built by them were steel below the window sill, the posts and superstructure being of wood. On the last fifty cars, however, they have extended the use of steel to the posts, both body and vestibule, and have also used it to a greater extent for inside sheathing. No difficulty has been experienced in repairing steel cars and although an appropriation was set aside for purchasing special tools for this purpose, it has not been necessary to use it. Special steel pressings are obtained from the car builders when replacements are necessary. It was stated that on future equipments some form of insulation would be used inside of the steel side plates. So far as the roof construction is concerned, steel is used only to reinforce the carlines adjacent to the side posts. The headlining is of bird's-eye maple, with natural finish.

A variation in equipment is that the platform gongs are

placed on the vestibule hood and sounded by the motorman by pulling a cord convenient to the controller handle. This has been found very satisfactory, giving little trouble except during sleet storms. The motormen are said to like the roof gong better than that operated by foot. Sand boxes are used on all four corners, being placed under a seat inside the car body. They consist of a hopper for the sand with a slide at the bottom operated by a rod so connected to a lever on the platform that a pull on one lever operates two sand boxes. The boxes are of the Robinson type, in which the closing of the valve is intended to be effected by the use of a spring. In Pittsburgh, however, the springs are omitted and the flow of sand is stopped by pushing the lever back. About twenty pneumatic sanders are used, but these have not been found satisfactory.

Fare boxes of the Brill four-compartment type are used in connection with the register. The money is not available for the conductor's use after it is placed in the fare box. Change is provided by men stationed at various points. It was stated that fares collected in the boxes usually exceed the amount registered. Transfers are not registered.

### UNITED RAILWAYS OF ST. LOUIS

The last 150 prepayment cars of the United Railways of St. Louis are of semi-steel construction, arranged for single-end operation. The extra wide aisle of 30 in. was obtained by making the car 8 ft. 9⅞ in. wide over the side posts.

The rear platform has a cab for the conductor. This inclosure has hinged folding doors at the side of the platform for the exit of passengers and balanced sash arranged to raise so that fares can be collected at the entrance side. This compartment is open to the interior of the car body, a pipe railing being provided partly to divide the compartment from the interior. A swinging door with a clear opening of 27⅛ in. is used in the bulkhead at the entrance side of the rear platform. This door swings both outward and inward. The rear platform, except the conductor's compartment, is open with a railing and dash iron at the rear of the car, extending around the side of the platform. Smoking is allowed on this platform. The front platform is the same size as the rear because it was originally intended to provide seats on it. This arrangement was abandoned, however, since the space was required for sand boxes and other equipment. The motorman's position is at the right-hand side of the platform and a railing divides him from outgoing passengers. The forward end of the car body is left open on the exit side and the side of the

REPRESENTATIVE TYPES OF DROP-PLATFORM PREPAYMENT CARS.

| Railway. | Type of Car. | GENERAL DIMENSIONS. Length Over Bumpers. | Length of Body. | Width Over Sides. | Truck Centers. | Type of Seating. | NUMBER OF SEATS. Body. | Platform. | Total. | Weight Completely Equipped Without Passengers, Lb. | WEIGHT PER SEAT. In Body, Lb. | Total, Lb. | Width of Aisle, in Inches. | Length of Trns. Seat Cushion, ih Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baltimore | P.A.Y.E. Brill convertible | 43′-9″ | 30′-8″ | 8′-2″ | 18′-8″ | 28 cross, 14 long | 42 | 0 | 42 | 43,000 | 1024 | 1024 | 22¼ | 32½ |
| Boston | Easy-access semi-convertible | 48′-2¾″ | 34′-4″ | 8′-8″ | 24′-0″ | 36 cross, 16 long | 52 | 0 | 52 | 53,000 | 1019 | 1019 | 28 | 32½ |
| Chicago City | P.A.Y.E. closed | 46′-0⅜″ | 32′-0″ | 8′-2⅞″ | 20′-5″ | 28 cross, 12 long | 40 | 0 | 40 | 51,500 | 1287 | 1287 | 24 | 33 |
| Chicago Railways | P.A.Y.E. closed | 45′-0″ | 31′-2″ | 8′-3″ | 19′-5″ | 28 cross, 12 long | 40 | 0 | 40 | 45,300 | 1132 | 1132 | 23 | 34 |
| Cleveland | P.A.Y.E. closed | 50′-0″ | 35′-5½″ | 8′-2 15/16″ | 23′-5½″ | 40 cross, 12 long | 52 | 0 | 52 | 50,000 | 961 | 961 | 22 | 34 |
| Cincinnati | Pay-within closed | 44′-0″ | 33′-0″ | 8′-0″ | 21′-0″ | All longitudinal | 43 | 0 | 43 | 34,600 | 804 | 804 | ... | ... |
| Detroit | Pay-within closed | 43′-10″ | 31′-3″ | 8′-3½″ | ..... | 24 cross, 24 long | 48 | 0 | 48 | 43,000 | 895 | 895 | 21½ | 33 |
| Milwaukee | P.A.Y.E. closed | 50′-0″ | 35′-0″ | 8′-5½″ | 24′-0″ | 36 cross, 16 long | 52 | 0 | 52 | 54,700 | 1052 | 1052 | 25 | 34 |
| Public Ser. Rwy. | Double-entrance pay-on-platform, closed | 46′-4″ | 32′-0″ | 8′-4″ | 20′-0″ | All longitudinal | 42 | 0 | 42 | 45,600 | 1085 | 1085 | ... | ... |
| New York Rys. | P.A.Y.E. closed | 46′-11″ | 32′-0″ | 8′-0″ | 24′-0″ | All longitudinal | 42 | 5 | 47 | 38,000 | 905 | 808 | ... | ... |
| Third Avenue Ry. | P.A.Y.E. conv. | 43′-0″ | 30′-1″ | 8′-2″ | 21′-5″ | 40 cross, 11 long | 48 | 3 | 51 | 38,000 | 792 | 745 | 23½ | 32 |
| Phila.—1911 | Near-side semi-convertible | 45′-2″ | 34′-1⅜′ | 8′-6″ | 24′-6′ | 32 cross, 21 long | 53 | 0 | 53 | 38,000 | 717 | 717 | 27½ | 34 11/16 |
| Phila.—1912 | Near-side semi-convertible | 45′-2″ | 34′-1⅜″ | 8′-6″ | 24′-6″ | 32 cross, 22 long | 54 | 0 | 54 | 36,520 | 676 | 676 | 27 | 35 |
| Pittsburg | Pay-at-entrance closed | 47′-2″ | 33′-1½″ | 8′-2″ | 21′ 6″ | 23 cross, 29 long | 52 | 4 | 56 | 47,600 | 915 | 850 | ... | 34 |
| St. Louis | P.A.Y.E. closed | 47′-2¾″ | 33′-6″ | 8′-8¼″ | 22′-3″ | 40 cross, 6 long | 46 | 0 | 46 | 50,000 | 1087 | 1087 | 30 | 33 |
| Capital Traction | Pay-within semi-convertible | 41′-0″ | 28′-0″ | 8′-2″ | 20′-0″ | 24 cross, 12 long | 36 | 0 | 36 | 32,246 | 895 | 895 | 23 | 32 |
| Washington Rys. | P.A.Y.E. closed | 41′-9 1/16″ | 28′-3 1/16″ | 8′-0″ | 20′-3 1/16″ | All longitudinal | 33 | 0 | 33 | 34,900 | 1057 | 1057 | ... | ... |

REPRESENTATIVE TYPES OF DROP-PLATFORM PREPAYMENT CARS.

| Railway | MOTORS. Type. | No. per Car. | Hp per Car. | Hp per Ton, Light Car. | Trucks. | Controllers. | Sanders. | No. Sq. Ft. of Standing Room in Body. | Area of Rear Platform, Sq. Ft. | Street to Step, in Inches. | Step to Platform, in Inches. | Platform to Car Floor, in Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baltimore | W.-101 B2 | 4 | 160 | 7.44 | Brill 27-GE-1 | K-28-R | Hand | 76.70 | 36.7 | 15¼ | 14½ | 9½ |
| Boston | W-306 | 4 | 200 | 7.55 | Brill-27-MC-B 2 Standard 060 | West. HL unit switch group | Foot | 96.90 | 34.17 | 17 | 13 | 10 |
| Chicago City | GE-80 | 4 | 160 | 6.21 | Brill-27 FE1 | K-28-E | Air | 90.95 | 36.99 | 15 | 13¼ | 10⅜ |
| Chicago Railways | GE-226 | 4 | 140 | 6.18 | Brill-27 GE | K-35 | Air | 82.50 | 38.41 | 15½ | 13¾ | 11 |
| Cleveland | W-101-B 6 | 4 | 160 | 6.40 | Brill-27 FE1 | K-35 | Air | 88.90 | 45.13 | 15 | 14 | 12 |
| Cincinnati | W-318 | 2 | 130 | 7.51 | Brill-39 E | K-40-A | Foot | 85.50 | 29.49 | 17½ | 13½ | 11 |
| Detroit | GE-210 | 2 | 120 | 5.58 | Standard 050 | K-35-D | Hand | 83.18 | 41.95 | 16 | 14 | 11 |
| Milwaukee | GE-216 | 4 | 160 | 5.85 | St. Louis. MCB | K-35-D | Hand | 98.90 | 47.42 | 16⅞ | 13 7/16 | 11 |
| Public Service Rwy. | W-307 C | 4 | 160 | 7.02 | Standard C-50-P | West. unit switch | Air | 87.00 | 35.34 | 17 | 13 | 10 |
| New York Railways | W-310 | 2 | 130 | 6.84 | Brill-39 E | K-27 | Foot | 80.12 | 38.65 | 15½ | 13 | 8⅜ |
| Third Avenue Ry. | W-310 | 2 | 130 | 6.84 | Brill-39 E | K-27 | Hand | 63.50 | 32.73 | 15⅝ | 13 | 9⅜ |
| Philadelphia—1911 | GE-210 | 2 | 120 | 6.31 | Brill-39 E | K-36 F | Air | 104.49 | *45.2 | 15 | 14½ | 10½ |
| Philadelphia—1912 | W-306-C | 2 | 120 | .... | Brill-39 E | G-36-K | Air | ..... | *45.2 | 13 | 13 | 10½ |
| Pittsburgh | W-306 | 4 | 200 | 8.40 | Standard C50 | K-43 C | Hand | 100.28 | 28.6 | 17½ | 14½ | 12 |
| St. Louis | GE-216 | 4 | 160 | 6.40 | Dupont Double | K-35 F | Hand | 114.20 | 49.80 | 16 | 13 | 10 |
| Capital Traction | W-306 | 2 | 100 | 6.20 | Brill-39 E | K-27 | Hand | 62.65 | 35.95 | 16 | 14½ | 9 |
| Washington Rys. | GE-210 | 2 | 120 | 6.88 | Brill-39 E | K-39 | Hand | 104.66 | 36.61 | 16 | 13 | 7 |

*Front platform.

platform is provided with a sliding door which is operated by the motorman. Both platforms, for entrance and exit, are constructed in every detail under patents owned by the United Railways.

The construction of the cars is of the closed straight-sided type. A feature of the sash is that a rubber buffer is provided on the lower stile of the lower sash to form a tight joint at the bottom. The side of the car under the window stool is of 3/16-in. x 26-in. sheet steel plate applied in three sections. To the bottom of this plate is riveted an 8-in. x 3½-in. x 1½-in. angle, to which are attached the 4-in. I-beams which serve as cross bearers for the floor. These I-beams carry a ⅞-in. wooden floor which in turn is covered by a ⅞-in. monolith floor. The monolith is coped at the sides to facilitate cleaning. Trap doors with iron frames are used to hold this composition material.

The main motor and control cables are run in conduit with junction boxes provided under the controllers and condulets on the ends of the conduits at outlets for motors and resistances. Screw connectors for the motor are placed in hickory blocks. A fuse box of special design is located in the front vestibule above the motorman's head and to his right. This box is so designed and placed that when the fuse blows the smoke and arc pass to the outside of the car through louver openings. The fuse can be replaced by the motorman without leaving his position on the platform. The capacity of the main motor fuse is approximately 400 amp.

The company uses its own non-registering type of fare box which does not give the conductor access to the money after it has been deposited. Cash fare and tickets are deposited in fare boxes. Transfers, laborers' passes and other tickets of no cash value are not registered.

### CAPITAL TRACTION COMPANY

The standard city car of the Capital Traction Company, Washington, D. C., is of the pay-within type with bulkheads open the full width of the car. The underframe construction of this type is similar to that of the Brooklyn Rapid Transit Company's convertible cars in that a heavy steel plate is used for the side sills, the same plate forming also the outside sheathing of the car. Unlike the Brooklyn convertible cars, however, the Washington cars have a convex panel above the steel plate and a window pocket is provided in the side of the car. This construction has certain advantages over the usual thin steel or wooden-sheathed car as the heavy steel plate is not ordinarily damaged by impact with wagons, etc. These side plates are extended around the ends. The latest lot installed on the Washington cars are ¼ in. x 18 in., the earlier ones being ¼ in. x 20 in.

The change to the pay-within design was due to the desire of the officials to reduce the boarding and alighting accidents to a minimum. Expressed in figures, the comparative expense from accident and damage costs due to boarding and alighting on the three different types of cars operated by this company is as follows: Pay-within cars, 1; pay-as-you-enter cars, 4.03, and old standard non-prepayment cars, 14.8.

The pay-within cars are arranged for double-end operation, with hand-operated folding doors at the sides of the platforms. The exit at the front is controlled by the motorman and the entrance and exit doors at the rear by the conductor. All doors on the latest cars fold outward, differing in this respect from the first lot, on which the front exit doors folded inward. The latter arrangement was found objectionable, especially when the cars were crowded because the doors would swing toward outgoing passengers. The front exit door when open, being narrower than the wide doors used on the rear platform, is within the clearance line of the belt rail, but the doors on the rear platform extend 3 in. beyond this line. This is not objectionable in service as the doors are never open when the cars are in motion, but it does cause some trouble in carhouses where clearances are scant. All steps fold in conjunction with the operation of the doors. Wooden treads are used with lead-filled toe plates at the outer edge. A lead-filled toe plate is also used at the end of the platform to prevent the wear of the platform boards. The company makes its own toe plates of scrap lead and babbitt dross by pouring into an iron mold. This is found very economical because when the plates become worn they can be melted and used to make new ones.

A count taken of passengers boarding during the evening rush hours indicated the following average time per passenger for the three types of cars operated:

| Type of Car. | Average Time in Seconds at Cash Fare Point. | Average Time in Seconds at Cash Fare Point. |
|---|---|---|
| Pay-as-you-enter | 2:27 | 1:42 |
| Pay-within | 1:71 | 1:45 |
| Old standard (non-prepayment) | 2:00 | (Not obtained) |

It will be noted that the pay-within cars made the most favorable showing at the point where cash fares were collected. Of course, a limited count such as this does not indicate the true conditions, but the figures shown should give a generally fair average. As to comparative time of loading, the observations confirm data given by the company's officials to the effect that the pay-within car can usually be loaded somewhat more quickly than the pay-as-you-enter car, because in the case of the former cars passengers will endeavor to get on the platforms faster so that the side doors can be closed and the car allowed to go ahead.

No air brakes are used, the Sterling geared brake being installed on some cars and the Peacock on others. No main motor fuses are used, but protection of the motors against overload is furnished by two circuit breakers, one on the positive and one on the negative side, which are set to break the circuit at 250 amp. The main cables are of the Roebling "stuffed" type, placed in transite-lined boxes above the floor on the inside of the car as well as under the platforms to the controllers. The wires run directly into the controller without the use of junction boxes. A transite-lined junction box is provided for the Westinghouse knuckle-joint connectors placed in the motor leads. The heater wiring is run in the same cable box as the main cables with outlets provided at each heater.

Cash fares and tickets are registered separately on two-fare registers placed at one end of the car and operated through one register rod device which is placed in the center of the car and supported on bronze ceiling brackets. The registration on the two registers is effected by turning the rod in two ways, each direction operating one clock only. Fare boxes have not been adopted on account of the inability to obtain a box that will satisfactorily handle tickets, which are used extensively in Washington. The tickets are registered separately from the cash fares. Arrangements are being made, however, for a trial installation of Cleveland fare boxes.

The company has under order at the present time for its Chevy Chase interurban division five pay-within cars of the same sliding air-operated door and folding step design as originally installed on this line.

The officials of the Capital Traction Company are well satisfied with pay-within cars and will undoubtedly duplicate them in case additional equipments are purchased.

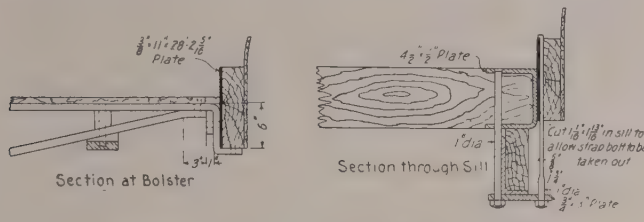
### WASHINGTON RAILWAY & ELECTRIC COMPANY

The Washington Railway & Electric Company's schedule calls for approximately 308 double-end cars, of which ninety-eight are of the pay-as-you-enter type and three pay-within. The remaining cars are mainly of non-prepayment type mounted on single trucks. The officials of this company all agree that the pay-within type has been found the most suitable from the standpoint of accident reduction.

The platforms on the pay-as-you-enter cars are open on the entrance side. This opening has swinging gates which are used on the front platform and also at the exit side of

the rear platform during regular operation. An outwardly swinging door is provided on the entrance side of the bulkhead and a sliding door controlled by the conductor is used for the rear exit. The swinging door on the front bulkhead is used for front exit.

In the construction of the underframe the company departed from the usual practice of placing the reinforcing plate on the outside of the side sill. Instead, the 2¾-in. x




**Washington—Sections at Bolster and Sill**

11-in. yellow pine side sill is reinforced on the inside by ⅜-in. x 11-in. steel plate. Between the bolsters another 1¾-in. x 6-in. yellow pine sill is provided to receive the cross timbers and diagonal bracing. This construction has an advantage in providing a better anchorage for bolsters and platform bearers, as is illustrated in the accompanying drawings, which show sections at the bolster and end sill respectively.

A departure from the standard construction of the Brill 39-E maximum traction truck was made by placing the bolster only 1 in. instead of 4 in. off center. This change provides for additional weight on the pony wheels to minimize derailment.

Fare boxes of the Brill and Cleveland designs with registering device attached are used on all prepayment cars. Much trouble has been experienced with the use of fare boxes due principally to the large number of tickets collected. The use of tickets no doubt is a factor in reducing boarding delays and thereby expediting the movement of cars, but has its disadvantages where fare boxes are used. The officials look favorably upon the elimination of fare boxes and the return to the regular method of registering fares on fare registers. They firmly believe that it would not be desirable to use both fare boxes and separate registers. Extensive records made by the company show that the average time required for loading and unloading the passengers is about two seconds per passenger.

SUMMARY AND CONCLUSIONS OF ORIGINAL REPORT

Upon referring to the preceding reports it will be noticed that a wide difference exists in the construction, finish and type of surface cars used in the largest cities of the United States. This difference is more marked at the present time than ever before in the history of street railway operation, evidently owing to the introduction of the prepayment car and the change from wood to steel for the principal members of the car framing.

The agitation for light equipment is also largely responsible for the many forms of construction recently applied to car building. While an endless number of different designs are used, the same construction rarely being found in two different cities, five distinct types of framing are as follows:

First—The standard wooden framing with convex and concave sides and sills reinforced with steel plates.

Second—The composite framing using heavy steel plates for the lower panels, wood or thin steel for the upper side panels and wood for the posts and superstructure.

Third—The composite framing using built-up steel girder side construction and steel floor framing with wood or thin steel serving as the outside sheathing.

Fourth—Semi-steel construction, using thin steel sheets on the outside of the body up to the window sill, steel floor members with wood for side posts and roof construction.

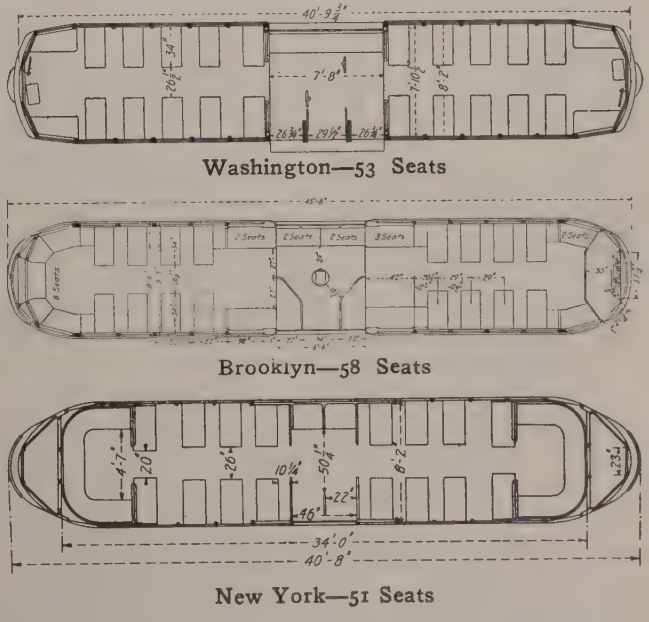
Fifth—All steel body, including side posts with thin sheet steel for outside sheathing, and with a steel body plate riveted to the top of the posts to form a girder of the side of the car.

The first type of construction is now practically obsolete, having been superseded by the more extensive use of steel for the principal members. A stronger and more durable, as well as lighter, frame can be built by a scientific application of pressed and commercial shapes of steel.

The second type of construction is commendable on account of the reduction in number of framing parts made possible therewith. A heavy steel plate for the lower outside panel of a car is very desirable from a maintenance standpoint on account of its durability and the resistance it offers against wagon collisions and abrasions. However, present cars with this type of framing use wooden sills and stringers bolted to the plate. A better arrangement would be to use angle irons at the top and bottom of the plate, thus considerably increasing its strength and adding to its stiffness; also a lighter and more durable frame would be provided by using light pressed-steel floor members. With this type of construction a light wooden superstructure is the most suitable. The upper side panel can be of poplar, agasote or thin steel, applied in sections so as to facilitate renewals. The last is probably the best, from a construction standpoint, as well as being the most economical to apply and maintain, but it would slightly increase the weight.

The third arrangement provides a very good construction, but it is probably more expensive to build and it adds to the weight, as in addition to the inside girder side frame it is necessary to provide outside sheathing, which cannot be counted on for strength; therefore, it is purely an addition to the body which would not be required if the member used to carry the load is also used for outside sheathing.

As to the fourth and fifth types of construction mentioned, these are similar except that in the latter the whole side of the car forms a girder to give the necessary strength, while in the former the girder extends only to the window stool. With both of these types it is possible to build a light body, and probably no other method pro-




**Seating Plan of Three Types of Center-Entrance Cars**

duces the same strength at a corresponding weight. There are, however, objections to this type of construction, for if the thickness of steel to be used for sides, posts, sheathing, etc., is to be governed by the required strength only, the material will be so thin as to be easily dented by slight collisions. Riveting also becomes difficult, thus impairing the efficiency of joints and making them subject to corrosion. Unless corrosion can be positively eliminated in

light steel construction, the life of the structure will be comparatively short. If steel of proper thickness to overcome these objections is used, the weight of the car would be increased to such an extent as to make this type of construction prohibitive.

As to the platform arrangement, most companies provide doors at the sides and folding steps, in order to minimize boarding and alighting accidents and to forestall the requirements of the municipalities to provide crews with proper protection against inclement weather. Manually operated folding doors are used almost exclusively as the pneumatic arrangement of operation has been found unreliable and costly to maintain. One road having a number of comparatively new cars in use with pneumatically operated doors is arranging to replace them with doors to be controlled by hand.

Drop and raise type of sash are used in about the same proportion. Where the former type is used the upper section is usually arranged to be raised into the car roof or behind the letterboard. This arrangement permits the maximum size of opening, but encroaches somewhat upon the aisle space and is more costly than where the lower sashes are arranged to raise. The most suitable type of sash arrangement depends somewhat upon the type of car. For instance, if open bulkheads are provided, the necessity for a large side window opening is not as apparent as if the end of body is closed, and a raise type of sash should, in this case, be entirely satisfactory. However, if closed bulkheads are used, a larger window opening than could be obtained with this form of construction would probably be necessary.

The seating arrangement most popular is that which provides for transverse seats in the middle portion of the car, with longitudinal seats at the ends to provide additional space near the entrance and exits. The average length of seat cushion used on transverse seats is about 33 in. and the spacing, center to center, ranges from 29½ in. to 31 in.

On most of the cars considered ventilation is provided by deck sashes, the usual arrangement being to hinge these sashes at ends and operate them in pairs by deck sash openers. This arrangement requires greater attention on the part of the conductor, as it is necessary to shift the ventilator sashes whenever the operation of the car is changed from one end to the other.

There seems to be a great diversity of opinion among the various operating companies regarding the collection of fares. Some officials advocate the use of both registers and fare boxes, while others are very strongly opposed to using two systems for recording fares, arguing that fare boxes only should be employed.

### CENTER-ENTRANCE PREPAYMENT CARS

Plans of the New York, Washington and Brooklyn center-entrance prepayment cars have been included in this article as an appropriate addition to the original report. The New York car was described in the Electric Railway Journal for March 16 and April 20, the Washington car in the issue for April 27, and the Brooklyn car in the issues of March 30 and June 22.

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The engineering department of the Chicago (Ill.) Railways has devised an interesting plan to prevent thefts of overhead and underground copper wires and cable. The foreman on every repair or construction job is required to carry an identification card signed by the head of the electrical department. The Chicago city police department has been furnished with a copy of this identification card properly filled out and signed, and the head of the police department has instructed the patrolmen to request the foreman on any job to present his card. This makes it hazardous for unauthorized persons to enter manholes or attempt to remove copper from the overhead system and has been found to be very successful.

## RAILWAY STATISTICS FOR YEAR ENDED JUNE 30, 1911

An abstract of the statistics of railways in the United States for the year ended June 30, 1911, based upon compilations for the twenty-fourth annual statistical report of the Interstate Commerce Commission, has been made public.

Substantially complete returns were rendered to the commission for 246,124.40 miles of line operated, including 11,006.86 miles used under trackage rights. The aggregate mileage of railway tracks of all kinds covered by operating returns was 362,710.18 miles. This mileage was thus classified: Single track, 246,124.40 miles; second track, 23,451.26; third track, 2,414.16; fourth, fifth, and sixth tracks, 1,747.10; yard track and sidings, 88,973.26. These figures indicate an increase of 10,943.59 miles over corresponding returns for 1910 in the aggregate length of all tracks, of which increase 3,391.33 miles, or 30.99 per cent, represent yard track and sidings.

It appears that there were 61,327 locomotives in the service of the carriers on June 30, 1911, indicating an increase of 2,380 over corresponding returns for the previous year. Of the total number of locomotives, 14,301 were classified as passenger, 36,405 as freight and 9,324 as switching, and 1,297 were unclassified. The total number of cars of all classes was 2,359,335, or 69,004 more than on June 30, 1910. This equipment was thus assigned: passenger service, 49,818 cars; freight service, 2,195,511; and company's service, 114,006. The figures given do not include so-called private cars of commercial firms or corporations.

The total number of persons reported as on the pay rolls of the steam roads of the United States on June 30, 1911, was 1,669,809. As compared with returns for June 30, 1910, there was a decrease of 29,611 in the total number of railway employees. There were 63,390 enginemen, 66,376 firemen, 48,200 conductors, 133,221 other trainmen, and 40,005 switch tenders, crossing tenders and watchmen. The total amount of wages and salaries reported as paid to railway employees during the year ended June 30, 1911, was $1,208,466,470.

On June 30, 1911, the par value of the amount of railway capital outstanding was $19,208,935,081. This amount includes capital held by the railway companies as well as by the public. Of the total capital outstanding, there existed as stock $8,470,717,611, of which $7,074,917,559 was common and $1,395,800,052 was preferred; the remaining part, $10,738,217,470, representing funded debt, consisted of mortgage bonds, $7,825,269,102; collateral trust bonds, $1,183,766,188; plain bonds, debentures and notes, $951,377,816; income bonds, $261,777,220; miscellaneous funded obligations, $195,430,395; and equipment trust obligations, $319,596,749. Of the total capital stock outstanding, $2,740,467,285, or 32.35 per cent, paid no dividends. The amount of dividends declared during the year (by both operating and lessor companies) was $460,195,376, being equivalent to 8.03 per cent on dividend-paying stock. No interest was paid on $755,449,047, or 7.25 per cent of the total amount of funded debt (other than equipment trust obligations) outstanding.

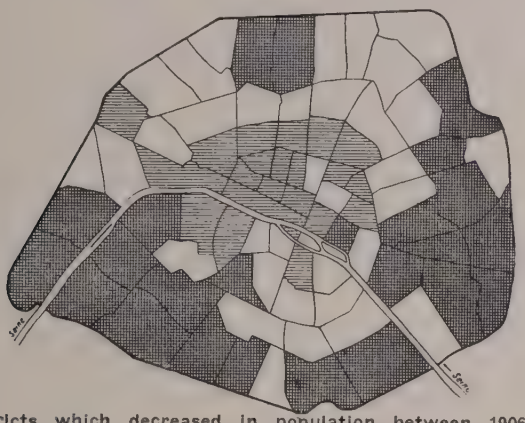
The number of passengers carried during the year ended June 30, 1911, was 997,409,882. The corresponding number for the year ended June 30, 1910, was 971,683,199. The number of tons of freight shown as carried (including freight received from connections) for the year ended June 30, 1911, was 1,781,637,954, while the corresponding figure for the previous year was 1,849,900,101.

The average receipts per passenger per mile, as computed for the year ended June 30, 1911, were 1.974 cents; the average receipts per ton per mile 0.757 cent. The passenger service train revenue per train mile was $1.30.921; the freight revenue per train mile was $2.89.548.

# THE INFLUENCE OF AN ELECTRIC RAILWAY IN THE DEVELOPMENT OF LARGE CITIES AND THEIR SOCIAL ASPECTS *

BY M. L. DAUSSET, COMPTROLLER OF THE CITY OF PARIS AND PAST-PRESIDENT OF THE CITY COUNCIL

A feature of the nineteenth century has been the growth of large cities. In 1800 there did not exist in Europe a single city of 1,000,000 inhabitants and there were only twenty-one containing more than 100,000 inhabitants. Their combined population was equal to one-thirty-fifth of the rest of the population of the continent, or 1,700,000. In 1900 the number of cities in Europe with a population of 100,000 or more was 148, and they contained more than


Districts which decreased in population between 1906 and 1911
Districts whose population increased more than 2000 inhabitants between 1906 and 1911

**Map of Paris Showing Movement of Resident Population Between 1906 and 1911**

40,000,000 inhabitants, or one-tenth of all of the people in the continent.

Up to within recently the tendency in these cities, owing to the lack of transportation facilities, was for the inhabitants to live in congested centers, but since the introduction of electric traction there has been a centrifugal movement toward the suburbs and a stationary or decreasing resident population in the center of the city. This has been particularly marked in Paris. As shown in the accompanying map, the central part of the city is gradually being given up to large buildings, public and private, and for business, while the population seeks more desirable places of residence in the suburbs. It is the purpose of this paper to consider some of the aspects of this movement of city de-centralization, as shown to-day, and the way in which, to use an expression happily employed by Mr. Neiszen at the Brussels Congress, the tramway is tending to supplant the stairs.

Statistics compiled by the Bavarian government indicate that the maximum distance which a workman will travel to go to and from his work is from 30 to 40 km (20 to 25 miles), which corresponds to a time for travel of between one and two hours. But the average distance traveled is very much less, and more than four-fifths of the workmen do not live more than 12 km (7½ miles) from their place of employment. Mr. Schimpff has calculated that a workman who is engaged on the waterfront in Hamburg and lives 7 km from his place of work would be able to save \$110—\$78, or \$32, in rent per year by moving to the suburbs, but at the price of \$15 extra in carfare per year. Mr. Neiszen estimates that in Amsterdam \$9 per year is about the expense for carfare for the average workman who lives 5.7 km (3½ miles) from his work. In Paris a workman who pays \$100 a year rent, for which in the suburbs he could get an entire house, would pay to be carried a distance of 8 km (5 miles) 8¾ cents per day, or \$26.25 a year.

In many countries the steam railroad companies recognize the advantage of encouraging workmen to live in the suburbs and operate special workingmen's trains on which reduced rate of fare is charged. The steam railroads, however, will never be able to grapple with the distribution problem as thoroughly as the tramways. Their stations are often distant from the objective point of the traveler within the city, and it is practically impossible for them to build city extensions because of the prohibitive cost of land. They can never act in this regard as a substitute for the electric railways.

Coincident with the development of long-distance electric railway travel there has been a large increase in the number of short-distance riders. The use of the street car seems to have become a habit in our modern city. Those who patronized the means of transportation once twenty years ago now use it many times. It may be from a desire to save time, or because of fear of physical fatigue, or it can be accounted for in many ways. Certainly city traffic has grown very much more rapidly than population. The accompanying table has been compiled for a number of principal cities of Europe and America, and is significant.

| City. | Year. | Population in Thousands. | Increase in Per Cent. | Passengers Carried. | Increase in Per Cent. | Rides per Inhabitant |
|---|---|---|---|---|---|---|
| New York[1] | 1880 | 1,911 | ..... | 287,501,000 | ..... | 150 |
| | 1900 | 3,437 | 79.79 | 846,353,000 | 194 | 246 |
| | 1910 | 4,766 | 38.70 | 1,531,262,000 | 80 | 321 |
| Berlin | 1875 | 1,014 | ..... | 15,375,064 | ..... | 15. |
| | 1905 | 2,952 | 191.00 | 350,500,000 | 2,179 | 119 |
| | 1910 | 3,377 | 14.37 | [2]445,798,398 | 27 | 132 |
| Paris, Département of the Seine[3] | 1880 | 2,789 | ..... | 240,877,000 | ..... | 86. |
| | 1905 | 3,849 | 38.00 | 690,093,000 | 186 | 179 |
| | 1910 | 4,154 | 7.90 | 1,023,018,000 | 48 | 249 |
| St. Petersburg[4] | 1905 | 1,673 | ..... | 97,288,426 | ..... | 58 |
| | 1909 | 1,860 | 11.19 | 193,386,408 | 98 | 103 |
| | 1910 | 1,907 | 2.52 | 229,630,232 | 18 | 120 |
| Moscow[4] | 1905 | 1,400 | ..... | 59,427,696 | ..... | 42 |
| | 1910 | 1,600 | 14.29 | 176,843,972 | 197 | 110 |
| Boston[5] | 1888 | 683 | ..... | 84,843,072 | ..... | 124 |
| | 1905 | 971 | 42.30 | 246,941,776 | 191 | 254 |
| | 1910 | 1,098 | 13.10 | 292,102,504 | 18 | 266 |
| Glasgow | 1895 | 750 | ..... | 57,104,647 | ..... | 76 |
| | 1905 | 1,000 | 33.33 | 195,767,519 | 242 | 195 |
| | 1910 | 1,050 | 5.00 | 222,730,571 | 13 | 212 |
| Brussels[6] | 1890 | 500 | ..... | 16,194,709 | ..... | ..... |
| | 1905 | 800 | 60.00 | 72,065,399 | 345 | 90 |
| | 1910 | 900 | 11.11 | 127,653,491 | 77 | 141 |
| Manchester | 1903 | ..... | ..... | ..... | ..... | ... |
| | 1904 | 750 | ..... | 120,772,368 | ..... | 161 |
| | 1905 | ..... | ..... | ..... | ..... | ... |
| | 1906 | 750 | ..... | 133,923,932 | 10 | 178 |
| | 1910 | ..... | ..... | ..... | ..... | ... |
| | 1911 | 900 | 20.00 | 165,800,077 | 23 | 184 |
| Munich[4] | 1901 | 506 | ..... | 52,590,256 | ..... | 103 |
| | 1905 | 538 | 6.52 | 54,641,632 | 3 | 101 |
| | 1910 | 596 | 10.66 | 103,341,998 | 89 | 173 |
| Leipzig | 1897 | 417 | ..... | 11,341,380 | ..... | 27 |
| | 1905 | 503 | 20.55 | 22,496,846 | 98 | 45 |
| | 1910 | 587 | 16.66 | 33,931,965 | 51 | 58 |
| Dresden[4] | 1900 | 475 | ..... | 72,280,129 | ..... | 154 |
| | 1905 | 544 | 14.58 | 89,529,002 | 24 | 164 |
| | 1910 | 576 | 5.52 | 118,242,725 | 32 | 205 |
| Cologne[4] | 1903 | ..... | ..... | 48,549,079 | ..... | ... |
| | 1905 | 513 | ..... | 65,241,630 | 34 | 125 |
| | 1910 | 572 | 11.50 | 97,265,427 | 49 | 170 |
| Amsterdam[4] | 1905 | 557 | ..... | 37,276,802 | ... | 66 |
| | 1910 | 573 | 2.93 | 70,788,946 | 89 | 123 |
| Prague[4] | 1897 | 390 | ..... | 14,065,088 | ..... | 36 |
| | 1905 | 496 | 27.00 | 24,361,696 | 73 | 49 |
| | 1910 | 551 | 11.00 | 49,452,769 | 103 | 89 |
| Marseilles | 1905 | 517 | ..... | 77,176,908 | ..... | 149 |
| | 1911 | 542 | 4.84 | 104,163,000 | 34 | 192 |
| Detroit, Mich. | 1895 | 250 | ..... | ..... | ..... | ... |
| | 1905 | 403 | 61.40 | 119,043,902 | ..... | 295 |
| | 1910 | 515 | 25.20 | 194,388,505 | 63 | 377 |
| Copenhagen[7] | 1901 | 400 | ..... | 51,118,500 | ..... | 128 |
| | 1905 | 450 | 12.50 | 58,338,000 | 14 | 130 |
| | 1910 | 500 | 11.10 | 75,399,100 | 29 | 151 |
| Frankfort[4] | 1899 | 257 | ..... | 34,500,000 | ..... | 134 |
| | 1905 | 330 | 28.00 | 62,600,712 | 81 | 189 |
| | 1910 | 487 | 48.00 | 93,462,861 | 49 | 191 |
| Leeds | .... | 428 | ..... | 57,239,000 | ..... | 133 |
| | 1905 | 450 | 4.90 | 64,223,000 | 12 | 142 |
| | 1910 | 484 | 7.50 | 78,385,000 | 22 | 161 |
| Sheffield | 1898 | 364 | ..... | 9,643,475 | ..... | 26 |
| | 1905 | 432 | 18.80 | 63,952,283 | 563 | 147 |
| | 1910 | 470 | 8.80 | 78,620,798 | 22 | 166 |
| Genoa[8] | 1901 | 400 | ..... | 29,486,946 | ..... | 74 |
| | 1905 | 415 | 3.75 | 42,297,335 | 43 | 102 |
| | 1910 | 440 | 6.02 | 63,856,812 | 51 | 145 |
| Nuremberg-Furth | 1882 | 130 | ..... | 2,200,000 | ..... | 16 |
| | 1905 | 355 | 171.70 | 22,300,000 | 913 | 62 |
| | 1910 | 399 | 12.50 | 37,100,000 | 66 | 92 |

*Abstract of paper read at the biennial convention of the International Street & Interurban Railway Association, Christiania, Norway, July 2-5, 1912.

| City. | Year. | Population in Thousands. | Increase in Per Cent | Passengers Carried. | Increase in Per Cent | Rides per Inhabitant. |
|---|---|---|---|---|---|---|
| Dublin..... | 1872 | 380 | ..... | ..... | ..... | ... |
| | 1905 | 380 | ..... | 50,399,067 | ..... | 132 |
| | 1910 | 380 | ..... | 54,356,330 | 7 | 143 |
| Düsseldorf..... | 1900 | 213 | ..... | 23,600,000 | ..... | 110 |
| | 1905 | 302 | 41.60 | 26,481,000 | 12 | 87 |
| | 1910 | 371 | 22.80 | 55,497,000 | 109 | 149 |
| Barmen-Elberfeld | 1890 | 260 | ..... | 4,873,205 | ..... | 18 |
| | 1905 | 318 | 22.65 | 9,727,812 | 99 | 30 |
| | 1910 | 334 | 4.68 | 11,179,048 | 14 | 33 |
| Aix-la-Chapelle... | 1905 | 262 | ..... | 12,407,292 | ..... | 47 |
| | 1910 | 332 | 26.70 | 20,151,931 | 62 | 60 |
| The Hague..... | 1908 | 302 | ..... | 28,325,524 | ..... | 93 |
| | 1910 | 321 | 6.14 | 31,295,663 | 10 | 97 |
| Chemnitz..... | 1905 | 247 | ..... | 16,901,735 | ..... | 68 |
| | 1910 | 297 | 20.10 | 25,114,315 | 48 | 84 |
| Magdebourg..... | 1900 | 229 | ..... | 21,436,200 | ..... | 93 |
| | 1905 | 240 | 4.40 | 25,662,015 | 19 | 106 |
| | 1910 | 278 | 15.80 | 31,221,824 | 21 | 112 |
| Bremen..... | 1902 | 193 | ..... | 17,294,841 | ..... | 89 |
| | 1905 | 212 | 9.84 | 22,573,084 | 30 | 106 |
| | 1910 | 268 | 26.65 | 29,875,270 | 43 | 111 |
| Bordeaux[9]..... | 1902 | 257 | ..... | 46,191,224 | ..... | 179 |
| | 1905 | 257 | ..... | 58,064,482 | 25 | 225 |
| | 1910 | 261 | 1.63 | 67,562,885 | 16 | 258 |
| Stettin..... | 1898 | 210 | ..... | 7,617,713 | ..... | 36 |
| | 1905 | 236 | 12.38 | 14,062,631 | 84 | 64 |
| | 1910 | 258 | 7.60 | 18,676,289 | 33 | 72 |
| Christiania[10]..... | 1876 | 78 | ..... | 1,462,210 | ..... | ... |
| | 1905 | 227 | 191.00 | 16,102,524 | 100 | 70 |
| | 1910 | 244 | 7.49 | 27,316,115 | 69 | 111 |
| Tunis..... | 1905 | 225 | ..... | 11,456,924 | ..... | 50 |
| | 1910 | 240 | 6.67 | 14,789,164 | 29 | 61 |
| Seattle, Wash.[11]... | 1902 | 114 | ..... | 36,456,010 | ..... | 318 |
| | 1905 | 163 | 42.90 | 55,264,423 | 51 | 337 |
| | 1910 | 237 | 45.30 | 103,608,046 | 87 | 437 |
| Strassburg..... | 1902 | 202 | ..... | 15,679,634 | ..... | 77 |
| | 1905 | 215 | 6.56 | 19,958,320 | 27 | 92 |
| | 1910 | 232 | 7.53 | 28,440,601 | 42 | 122 |
| Ghent[12]..... | 1898 | 199 | ..... | 2,471,714 | ..... | 12 |
| | 1905 | 205 | 2.81 | 5,276,433 | 113 | 25 |
| | 1910 | 208 | 1.59 | 10,089,445 | 91 | 48 |

[1]Surface, elevated and subway lines in Manhattan and Brooklyn.
[2]Including passengers carried by the municipal road.
[3]Surface lines, omnibus and subway.
[4]Municipal lines.
[5]Statistics of Boston Elevated Railway.
[6]Statistics of Tramways Bruxellois.
[7]Statistics of Kobenhavens Sporveje.
[8]Statistics of Italian Union Tramways.
[9]Statistics of the French Electric Tramway & Omnibus Company.
[10]The two principal lines.
[11]Statistics of the Seattle Electric Company.
[12]Statistics of the Ghent Electric Tramways Company, Ltd.

An examination of some of the individual divisions of these companies shows an even more rapid development of traffic.

### RESULTS ON SOCIAL CONDITIONS

Such a tremendous change in city conditions as has been effected by the city railway could not but have a notable effect on the social conditions of the community served with improved rapid transit service. There are many such changes, but perhaps the most important is that on family life. Workmen of our day begin work later and leave it earlier than formerly. Owing to the quicker transit the head of a family is able to spend more time with his family and live in the suburbs. Consequently he can lodge better and cheaper. If he prefers to waste this leisure time, this is a matter of social education and not the fault of the transportation system.

But it is not only the family ties which benefit. Intellectual activity is stimulated. It is sometimes said that time passed in transit on a railway or street car is lost, but this is a very superficial view to take of the subject. A passenger is carried comfortably in a well-lighted car and often takes this time to read. It may be that his reading consists of his daily paper, but we must not forget that the newspaper is the only intellectual recreation of the great majority of our contemporaries. No reading, of course, is practicable to the man who has to walk to and from his work. Formerly, also, the workman who walked to and from his work was under constant temptation to stop in on the way at saloons. This is not only impossible under the new plan, but in the suburbs there is far less either of incentive or opportunity for him thus to waste his time and money. It is often unwise to argue from effect to cause, but the average consumption per head of spirituous liquors in Paris has decreased from 7.5 liters in 1896 to 4.78 liters in 1906 and 4.22 liters in 1910.

Again, the tramway is a great leveler of social distinctions. Forty years ago, as will be seen from the novels of that time, persons in certain aristocratic circles considered it undignified to ride in an omnibus. To-day there is no means of transportation which can compete in point of time with the electric car or subway, and all classes must use it.

Rapid transit also plays an important part in the diversion of the community, as but little time is required to go from the suburbs to the theaters at the center of the city. In many cities the tramway companies operate a special theater service, but for the majority of inhabitants, of course, the theater is only an exceptional diversion. More interest attaches to modest social activities and excursions. Thirty or forty years ago it was practically impossible for the average Parisian to take his family for a day's excursion to the country. Now this can be done at a low cost, and the arrangements of the tramway company to take care of large crowds of people at the time of special festivities have reached a high degree of perfection. The development in rapid transit undoubtedly has had a great deal to do also with the growth of large department stores, to which customers from long distances can come quickly and easily. Conversely, of course, it has caused a diminution of the small shops. Whether this change is for good or evil does not concern this paper, but it is an interesting effect. The ease of access to these stores has probably also increased the comforts and luxuries of living as well as its expense. This may be the ransom which has to be paid for social progress. In conclusion, too great importance can hardly be placed upon the influence of transportation systems on the evolution of large cities.

## BERGMANN HIGH-SPEED LOCOMOTIVE FOR DESSAU-BITTERFELD LINE

Among the locomotives furnished the Prussian State Railways for the Dessau-Bitterfeld electrification is a high-speed locomotive made by the Bergmann Electricity Works. This locomotive has a two-axle pony truck at the front, two driving axles with wheels of 63-in. diameter in the middle and a trailing axle at the rear. The transmission system is operated by a single-phase series motor, the speed control and reversal of which is obtained by shifting the commutator brushes. The manufacturer believes this mechanical regulation to be highly desirable, inasmuch as it avoids the use of more costly electrical control apparatus. The brush-shifting mechanism is controlled by means of a hand wheel at the motorman's stand. For forward running the wheel is turned clockwise and for backward running it is turned anti-clockwise. The motor is rated at 1500 hp at 270 r.p.m., which corresponds to a locomotive speed of 49.6 m.p.h. During trial trips, however, a speed as high as 77.5 m.p.h. was attained.

It was specified that the locomotive should be able to haul continuously a train weighing 300 metric tons, and temporarily a train weighing 480 tons, in each case at the average speed of 43.4 m.p.h. In practice the locomotive has had no difficulty whatever in hauling passenger trains weighing more than 400 tons at the required speed, and freight trains weighing almost 1000 tons have been hauled at 34.1 m.p.h.

The normal drawbar pull is about 9900 lb. with a maximum of 34,100 lb. when the locomotive is at a standstill. This extraordinary overload capacity gives the electric locomotive a great advantage compared with the steam locomotive because full speed is built up much faster. This motor, like the others on the Dessau-Bitterfeld locomotives, is operated from a transformer which receives 10,000-volt, 15-cycle single-phase current from the trolley wire. The total weight of the equipped locomotive is 72 tons. The motor weighs 15 tons and the transformer 7.6 tons.

## BUFFALO MEETING OF BLOCK SIGNAL COMMITTEE

The joint committe on block signals of the Engineering and the Transportation & Traffic associations met at the Statler Hotel, Buffalo, July 27. Morning and afternoon sessions were held, during which the preliminary work of the members of the committee was discussed and definite plans were made for completing the committee's report to the Chicago convention. The following were in attendance: J. M. Waldron, Interborough Rapid Transit Company; C. D. Emmons, Chicago, South Bend & Northern Indiana Traction Company; L. F. Howard and H. W. Griffin, Union Switch & Signal Company; W. K. Howe and H. M. Sperry, General Railway Signal Company.

The subjects to which most attention were given were two-position signaling versus three-position signaling for electric roads and the aspects which should be made standard or recommended for two-position and three-position signaling in electric railway service.

The chairman presented a series of blueprints prepared under the direction of C. H. Morrison, signal engineer New York, New Haven & Hartford Railroad, which showed a series of aspects for a great many conditions, including both semaphore signals and light signals and for both two-position and three-position signaling, with and without markers. Messrs. Howe and Howard did not see the necessity for the use of marker lights with semaphore signals, but thought markers desirable in connection with three-position light signaling. With the red, green and yellow lenses at night it was sometimes difficult to distinguish between the red and yellow unless there was another marker light with which a comparison could be made. For that reason the engineers of the two signal companies considered the use of marker lights very desirable with three-position light signaling. Messrs. Emmons and Griffin thought that, although marker lights could safely be omitted from an electric road signal system and yet have the installation absolutely safe, these lights should be considered a part of a complete signaling system.

In the discussion of signal aspects, Mr. Howe presented drawings showing the aspects for an absolute-permissive signal system which would permit trains operating in the same direction to run under very short headway and absolutely block opposing trains. In this system the presence of a car preceding another car through a block would be indicated by a yellow light. This was the system which the Terre Haute, Indianapolis & Eastern and the Indiana Union Traction companies were installing at the present time. After Mr. Howe had briefly described it, the committee discussed its principal features. Mr. Emmons thought that wherever possible trains should be absolutely blocked for following as well as opposing movements. On some roads this might require the combining of two cars into a train, which would be economical from the transportation standpoint. He also expressed himself in favor of establishing the signal aspects in the most simple form. He did not think that the committee should lay down so many standards that no road could follow all of them, but rather it would be preferable to adopt a few standards and later add to them. Mr. Emmons also recommended confining the standard aspects for the time being to single-track signaling.

After a general discussion on the aspects to be recommended, the committee voiced the opinion that after further consideration it might recommend as standard practice three-position signaling and also as good practice two-position signaling, using the aspects which would be presented to the association in the committee report. The committee intends in its report to present typical views of signal aspects with titles showing just what each aspect means.

With regard to the instructions of the executive committee that the signal committee should prepare typical signaling layouts for various headways and speeds, Mr. Emmons thought it best to ask for more time on this subject. The conditions were so widely different on various roads that it seemed best in the wisdom of the signal committee to ask the executive committee for a revision of the requirements. John Leisenring, signal engineer of the Illinois Traction System, a member of the committee, had forwarded to the chairman several typical signaling plans with discussions as to their applicability to electric railway service. These were considered for inclusion in the committee report.

The committee then considered the assignment for each member's part of the completed report. C. D. Emmons and L. E. Gould were instructed to prepare a description of the advances in electric railway signal practices made by the manufacturers during the past year.

## THIRD AVENUE RAILWAY MAKES POWER CONTRACT WITH NEW YORK EDISON COMPANY

The Third Avenue Railway has entered into a contract with the New York Edison Company to supply it with all of the electrical energy necessary for the operation of its various lines in the city of New York. As part of the agreement the Kingsbridge station of the railway company will be leased to and operated by the Edison company. The actual plans are still in a formative stage, since the contract does not become operative until about October. The purpose of the contract is, of course, to secure higher operating and investment economies, which means that the two systems will be so merged and jointly operated that that which is best in the one will be utilized to contribute to the improvement of the other. Both the Waterside and the Kingsbridge station are equipped with 6600-volt, three-phase, 25-cycle generators.

In addition to the higher load-factor possible on the general system, it is expected that there will be a large investment saving on future extensions, operating economies through the joint occupancy of substations and such other advantages as may accrue to a general system in operating the large generating stations of the two corporations at the most economical loads. It is significant that the station and the generating equipment of the Third Avenue Railway Company are still in good operating condition, having been maintained in and operated at a high state of economy and efficiency.

The Kingsbridge station is located at 218th Street and the Harlem River. It was designed by Westinghouse, Church, Kerr & Company, and the first unit was placed in operation about 1903. The equipment consists of eight vertical cross-compound Westinghouse engines, directly connected to 3500-kw, 6600-volt, three-phase, 25-cycle Westinghouse generators. Steam is supplied by thirty Babcock & Wilcox water-tube boilers set in batteries of 1000 hp. The coal bunkers are on top of the boiler room, fuel being delivered to them by conveyors and fed by gravity to automatic stokers with which the boiler furnaces are equipped. Ashes are handled by gravity from the ash pits to conveyors in the basement, whence they are taken to bunkers on the dock which discharge into barges. A feature of the layout is a large central condensing plant of the barometric type located in the boiler room which serves the entire station. The auxiliaries are all steam-driven.

The space required per kilowatt in the Kingsbridge station is 1.16 sq. ft. for boiler and engine rooms together. Although test figures are not available, it is generally understood that the station is capable of delivering a kilowatt-hour at the switchboard for approximately ½ cent.

The terms of the contract have not been announced.

## ANOTHER PHILADELPHIA BULLETIN

On July 29 the Stotesbury management of the Philadelphia Rapid Transit Company issued to its employees Co-operative Bulletin No. 7. This bulletin first discusses several methods of improving the service recently put in operation. One of these is by stopping cars on the near side of streets only, as begun on all parts of the system July 21. The second method is by increasing the number of elevated trains and running more west side surface lines through the subway so as to relieve the west side surface tracks. The third is to increase the number of cars on the through north and south lines made possible by the reduction in numbers of east and west surface cars. Mr. Mitten, in discussing the removal of the far-side stop, said that, in the opinion of the timetable department, it would finally result in increased wage of 1 cent per hour to the motormen and conductors under the 22 per cent rate plan.

### ASSIGNMENT OF RUNS

The bulletin also gives a synopsis of the meeting of the co-operative committee on July 23. At that meeting it was explained that no swing runs had been put out under the revised car schedules where the maximum time covered exceeded fourteen hours. The majority of the swing runs had a midday break for luncheon of from two to three hours; those which had a longer break would be kept down to the smallest number possible consistent with the close adjustment of cars operated to the needs of the traffic. The timetable department is also endeavoring wherever possible to give the men who work straight through their day's work a "fall back" for luncheon. Other proposed improvements were mentioned.

### DISCIPLINE

Chairman Mitten talked upon the desirability of co-operation between the division superintendents and the co-operative committeemen, calling upon the division superintendents to take a fatherly interest in and fight for what they believed to be right for their men, and calling upon the co-operative committeemen to work for improved discipline. The chairman stated that by so co-operating all small matters of difference occurring at the depots could be adjusted without taking up the time of the co-operative committee. Continuing, Chairman Mitten said:

"You all well know, as do I, that some of the men, despite the cautions already given, persist in spending their time doing all they can to disturb that which the co-operative committee is trying to accomplish and to manipulate things so that the company from which they draw their pay may be unsuccessful in carrying out this co-operative plan. These men must now be dismissed. It is due everybody that this be done, just as much as it is due that the man who really does his duty should be protected."

### ABUSE OF SICK LEAVE

The practice of men securing a leave of absence (particularly sick leave) for the purpose of securing employment elsewhere was also discussed by the committeemen. Divisional order No. 12, dated June 24, 1912, in this regard reads as follows:

"Motormen or conductors who lay off sick or obtain leave of absence by claiming sickness when such is not the case will not be permitted to return to the service."

Where suspicion was directed toward any motorman or conductor in this regard an investigation was promptly made, the result being that during the past month a number of dismissals had occurred because of the violation of this order, some other men under suspicion being permitted to return to duty during investigation, having first made affidavit that during their absence they had neither sought for nor obtained employment elsewhere. Leave of absence, other than sick leave, is granted for periods of from three to thirty days, dependent upon length of time of service and the supply of extra men at the time request is made.

### OTHER SUBJECTS

Other subjects discussed were seniority, the changing over of some of the existing single-truck cars to near-side cars, the necessity of exercising care in accident prevention and the misuse of transfers.

The following report was then presented and accepted by the committee on the condition of the 22 per cent fund for the year ended June 30, 1912:

| | |
|---|---|
| Gross passenger earnings | $21,727,468.23 |
| 22 per cent fund set aside from the above | 4,780,043.03 |
| Expenditures made out of this 22 per cent fund for the period of twelve months ended June 30, 1912, were as follows: | |
| Timetable cost | $4,710,756.03 |
| Unearned wages at the rate of $2 per day paid to returning strikers under agreement of April 5, 1910 | 6,667.03 |
| Pensions and death benefits | 18,690.50 |
| | $4,736,113.56 |
| Unexpended balance in the 22 per cent fund at June 30, 1912 | 43,929.47 |

## SETTLEMENT OF THE BOSTON STRIKE

The strike on the Boston Elevated Railway which began on Friday, June 7, was officially declared off on Monday of this week, following a long series of conferences at the State House between Governor Foss, Mayor Fitzgerald of Boston, the executive committee of the company and representatives of the strikers. Under the agreement adopted the State Board of Conciliation and Arbitration shall specify the individuals among the company's former employees whom it considers worthy of re-employment, and future grievances or difficulties concerning wages or conditions of labor which cannot be adjusted between the company and its employees are to be referred to this board, or, if that is not agreeable to the company, to a board composed of one member selected by the organization, one of the company, and a third by these two. The Mayor of Boston is named as the third member in case the two first selected cannot agree upon a third arbitrator within a specified time. The position of the loyal employees of the company in no case will be disturbed, nor will the company abandon the open shop principle.

Relation of Trips Scheduled, Trips Run and Percentages Run, Boston Elevated Railway, June 7–July 29, 1912

| | Trips Scheduled. | Trips Run. | Percentage Run. | | Trips Scheduled. | Trips Run. | Percentage Run. |
|---|---|---|---|---|---|---|---|
| June 7 | 14,585 | 8,887 | 60.9 | July 1 | 14,281.5 | 14,114.5 | 98.8 |
| " 8 | 14,585 | 7,965 | 54.6 | " 2 | 14,355.5 | 14,171 | 98.7 |
| " 9 | 11,252 | 7,136 | 63.4 | " 3 | 14,409.5 | 14,276.5 | 99.1 |
| " 10 | 14,585 | 9,817 | 67.3 | " 4 | 13,817 | 13,703.5 | 99.1 |
| " 11 | 14,585 | 10,329 | 70.8 | " 5 | 14,244 | 14,092 | 98.9 |
| " 12 | 14,585 | 11,222 | 76.9 | " 6 | 15,132 | 15,069 | 99.5 |
| " 13 | 14,585 | 11,450 | 78.5 | " 7 | 12,987 | 12,953 | 99.8 |
| " 14 | 14,884 | 12,803 | 86.0 | " 8 | 14,304 | 14,188 | 99.1 |
| " 15 | 14,034 | 11,991 | 85.4 | " 9 | 14,442 | 14,391 | 99.6 |
| " 16 | 10,420 | 9,529.5 | 91.4 | " 10 | 14,532 | 14,475 | 99.6 |
| " 17 | 12,846 | 11,649.5 | 90.7 | " 11 | 14,384 | 14,256 | 99.1 |
| " 18 | 14,440.5 | 13,224.5 | 91.6 | " 12 | 14,533 | 14,478 | 99.6 |
| " 19 | 14,629 | 13,663 | 93.4 | " 13 | 15,497 | 15,433 | 99.6 |
| " 20 | 14,622 | 13,844 | 94.7 | " 14 | 12,373 | 12,356 | 99.9 |
| " 21 | 14,530 | 13,960.5 | 96.1 | " 15 | 14,519 | 14,470 | 99.7 |
| " 22 | 14,864 | 14,547 | 97.9 | " 16 | 14,423 | 14,381 | 99.7 |
| " 23 | 12,609.5 | 12,601 | 99.9 | " 17 | 14,622 | 14,582 | 99.7 |
| " 24 | 14,283 | 13,868 | 97.1 | " 18 | 14,371 | 14,259 | 99.2 |
| " 25 | 14,345 | 13,966 | 97.4 | " 19 | 14,647 | 14,590 | 99.6 |
| " 26 | 14,338.5 | 14,154.5 | 98.7 | " 20 | 15,588 | 15,542 | 99.7 |
| " 27 | 14,334 | 14,215 | 99.2 | " 21 | 10,535 | 10,498 | 99.6 |
| " 28 | 14,440.5 | 14,389.5 | 99.6 | " 22 | 14,507 | 14,473 | 99.7 |
| " 29 | 15,283 | 15,123 | 99.0 | " 23 | 14,561 | 14,524 | 99.7 |
| " 30 | 12,683 | 12,603 | 99.4 | " 24 | 14,566 | 14,533 | 99.7 |
| | | | | " 25 | 14,519 | 14,483 | 99.7 |
| | | | | " 26 | 14,386 | 14,362 | 99.8 |
| | | | | " 27 | 15,387 | 15,341 | 99.7 |
| | | | | " 28 | 13,570 | 13,551 | 99.8 |
| | | | | " 29 | 14,294 | 14,236 | 99.6 |

A review of the situation shows that from the beginning of the strike the company had substantial control of the

operating situation, as evinced by the accompanying table of trip schedules, trips run and percentage run from June 7 to July 29. In the first days of the strike the percentage of scheduled trips run daily at times fell to between 50 and 70 per cent of normal service, but within nine days of the inception of the strike over 90 per cent of normal service was restored, and at no time since June 22 has the number of trips been less than 98 per cent of the scheduled time card. Far less than half the transportation employees of the company left its service, and the absence of violence after the vigorous suppression of rioting during the first three weeks of the strike was a notable feature of the situation.

## COMMUNICATION

### THE CROSBY RATE BILL

Wilmington, Del., Aug. 1, 1912.

To the Editors:

May I take a little of your space to point out that 15 per cent, which appears as the maximum allowable return on new investments in public utilities in the bill drafted by me and published on page 94 of your issue of July 20, is not intended to cover every possible case arising in the United States?

The bill was drawn for application to interstate carriers. Any such provisions as those which the United States could enforce must apply only where the states have not, in their individual sovereignty, made different arrangements with capital invested in their territory. Fifteen per cent seems to me a fair average maximum rate to be used in any such case in which the maximum rate had not been fixed by the State. My hope is that each State will adopt legislation along the same general lines as are indicated in the bill drafted by me. In that case, Arizona might have 20 per cent as a maximum for new capital, while Massachusetts might have 10 per cent. Moreover, it is quite practicable that individual companies should be chartered with a yet different scale one from another, but in each case the theory of the bill could profitably be applied to control returns on investments made at different periods in the life of the company. It should be noted that in all cases it is proposed that no attack shall be made upon earning capacity by rate reductions to such an extent as would, in itself, prohibit the continued payment of different dividends which may, during stated periods of the past, have been earned upon "old capital in old companies."

The subject is rather a complex one and cannot be easily treated in a popular way. Its importance, however, urges me to trespass thus further upon your space.

Oscar T. Crosby, President.

## LA SALLE COUNTY ELECTRIC RAILROAD, OTTAWA, ILL.

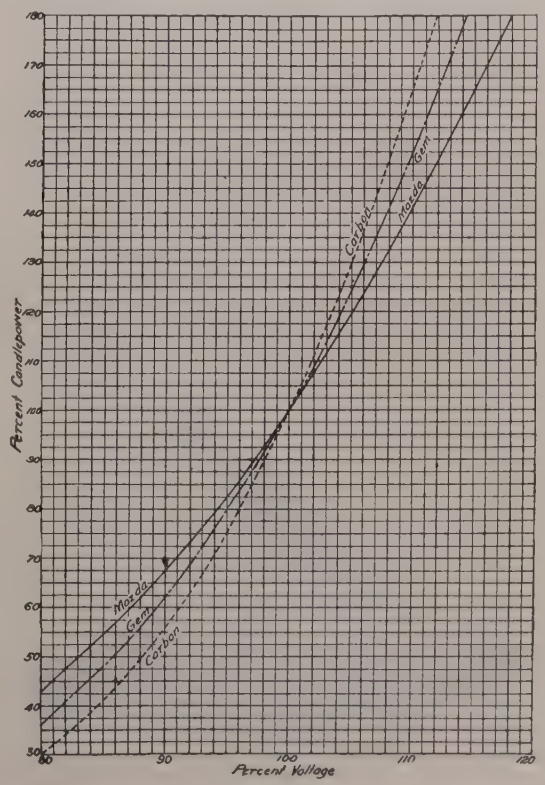
The La Salle County Electric Railroad Company, which is building an electric line from Ottawa to Mendota, Ill., with a branch from Prairie Center to Earlville, Ill., has completed the grading between Ottawa and Prairie Center and will begin laying steel on this section of the road at once. The grading from Prairie Center to Mendota and Earlville has progressed so that the engineers predict this much of the electric road will be in operation by Nov. 1, 1912. The part of the line under construction is 38 miles long, and recently the company has financed an extension from Earlville to Sandwich, paralleling the Chicago, Burlington & Quincy Railroad and extending north from there to either DeKalb or Sycamore, where it will tap the DeKalb-Sycamore & Interurban Traction Company's lines.

Equipment for that part of the road to be completed this year has been purchased and includes three 200-kw, 1200-volt d.c. engines and generators of the Ridgway Dynamo & Engine Company's design for the power house to be built at Prairie Center; three passenger cars 48 ft. over all and 8 ft. 10 in. wide from the McGuire-Cummings Manufacturing Company, with four GE-205 motors with type M control and automatic air-brake equipment; one package express motor 45 ft. over all and 8 ft. 10 in. wide, with the same electrical and brake equipment as the passenger cars; two flat cars and one box car for construction service.

The road was financed by $125,000 in bonds sold locally and $375,000 in bonds sold in France; $500,000 in preferred stock has also been issued and sold in the open market. The road is built on private right-of-way which was purchased, the company accepting no donations. All construction work is being done by the company's engineering and construction organization known as the Central Engineering Company. The officers include G. H. Dodge, Chicago, president, and F. S. Abraham, Chicago, secretary and treasurer.

## LIGHTING ELECTRIC RAILWAY CARS

After careful study of existing conditions, the General Electric Company has recently standardized high efficiency Edison Mazda tungsten metal filament and Edison Gem metalized carbon filament lamps for standard electric railway lighting service. The filament of the Edison Mazda railway lamp is made of drawn tungsten wire, but unlike the old pressed tungsten filament it consists of one continuous length of wire with uniformity of size and composition; and fragility, heretofore the chief objection to ordinary tungsten lamps for railway service, has been eliminated. The Edison Gem lamp has a carbon filament, but it has




**Relative Variations in Candle Power of Three Types of Lamps at Various Voltages**

been metalized by a special process of electro-thermal treatment which imparts the characteristics of a metal filament. While not so efficient as the Mazda, the Gem lamp possesses qualities that assure much better service than that of strictly carbon filament lamps. The curves

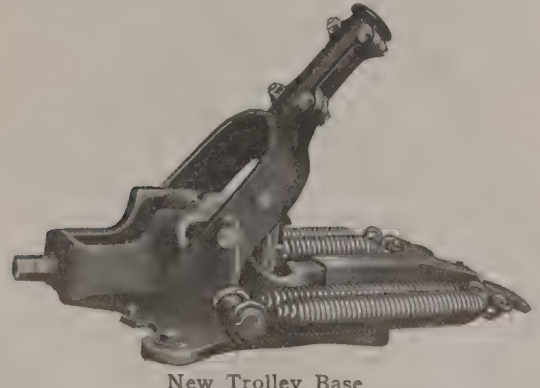
illustrated indicate the relative variations in candle power of the three types of lamps with voltage fluctuation.

The essential characteristics of these high efficiency railway lamps may be summarized, namely: high melting point, low vapor tension, greater light radiation, positive temperature coefficient. The high melting point of the filament enables it to operate at very high temperature, and as the temperature of an incandescent filament rises, both the quantity of light given off increases and the quality improves rapidly. The low vapor tension of the filament prevents undue evaporation. Rapid evaporation of a filament causes discoloration of the bulb which is commonly seen in low efficiency lamps and interferes with the proper diffusion of light. Greater light radiation is secured from drawn wire tungsten and metalized filaments because of their high selectivity; a greater percentage of the energy consumed is dispelled within the limits of the visible spectrum, and the lamp becomes a more efficient luminous radiator. As the surface of such filaments is smoother, less heat is radiated and therefore less current is required for operation. Finally, because drawn wire tungsten and metalized filaments have a positive temperature coefficient, that is, the resistance increases with a rise of temperature, the current does not change in the same ratio as the voltage, but in a smaller proportion. Thus these lamps undergo a smaller change in candle power, efficiency and life with a variation in line voltage than the strictly carbon filament lamp.

## A NEW TROLLEY BASE

The Ohio Brass Company has just placed on the market the new design of trolley base shown in the accompanying illustration. It is simple in construction and possesses several original features. The tension spring arrangement, which has heretofore proved very popular, has been incorporated in this design in such a manner as to give a practically uniform tension on the trolley rope throughout the entire range of movement. The ends of the springs are formed over the cone-shaped ends of eye forgings, giving a substantial construction and reducing to a minimum the possibility of springs breaking. Special sleeve bearings, which may be easily renewed when worn, are provided between the fork casting and the forged rings at the ends of the springs.

The base rotates on improved roller bearings set in a cage so that they may be removed from the base as a single unit. The cage also prevents the rollers from becoming skewed and jammed in the case. To clean and oil the bearings, it is only necessary to remove one screw, after

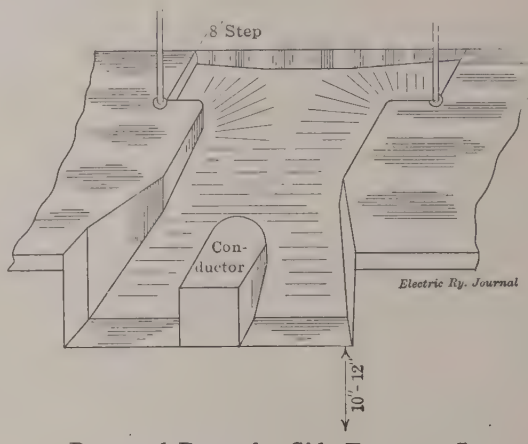


**New Trolley Base**

which the whole mechanism may be lifted off the turret without even any alteration in the tension of the springs. Since it is so easy to gain access directly to the bearings, no oil holes are provided in the casing, and it is, therefore, absolutely waterproof. Renewal of trolley poles in the carhouse is greatly simplified by a hook which holds down the fork. Buffing action is provided for by a compression spring and the sliding action of the yoke in such a manner as to prevent the trolley pole from becoming bent, as well as to relieve the bearing of all unbalanced strains.

## RAMP FOR SIDE-ENTRANCE CARS

To meet the requirements of side-entrance cars, Charles C. Crewson, Metropolitan Street Railway, Kansas City, Mo., has recently invented a modification of his platform ramp with tread inserts. Mr. Crewson's method, as used on twenty-five prepayment cars of his company, was described in the Electric Railway Journal for Oct. 7,




**Proposed Ramp for Side-Entrance Cars**

1911, and an adaptation thereof for single-end cars in the issue for Nov. 4, 1911.

In the case of one-way side-entrance cars, the use of this ramp, with an inside step of 8 in. to the main floor, will permit the distance between the ground and the car floor at the doorway to be lowered to 10 in. or 12 in. without requiring any change in the standard types of trucks, motors or other under-car equipment. As the grade of this ramp may with safety be steeper than a smooth floor incline, it should afford greater seating area. If a front-end exit door is used, the same style of ramp could be installed in connection with a door and folding step which could be operated in conjunction with the main doors and steps if desired.

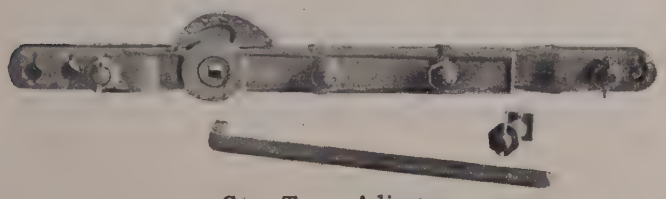
## GEAR RECORDS ON A FAR WESTERN ROAD

The Tool Steel Gear & Pinion Company, Cincinnati, reports the result of a test with various types of gears and pinions by one of the large electric railway lines on the Pacific Coast. In its pinion test the company tried five different grades of untreated, seven different grades of "special" and one grade of "tool" steel, and of gears two grades of untreated and one of "tool" steel. While there was some variation between the mileage obtained from different grades, the average of all untreated pinions showed a ratio of efficiency of 1 to 9½ and the specials an average of 1 to 8, as compared with the "tool" steel material. The ratio in the gears was 1 to 8⅔. The test was conducted in a city where the L. C. L. freight rate is $2.60 per 100 lb. The gear weight was 252 lb. and the pinion 21 lb., making the freight charges $6.55 and $0.55 respectively. Upon this basis the economy of the tool steel was very pronounced, because the freight charges on 8⅔ untreated gears and 9½ untreated pinions amounted to $61.98, as compared with $7.10 for the freight on one pair of hard gears and pinions which would possess the same life. The company reports that there were undoubtedly a number of other savings, such as drayage, installation, etc., which, although not as great as the freight saving, were worthy of consideration.

## BRAKESHOE ADJUSTERS AND RADIUS BAR

L. Zink, smith-shop foreman, Detroit United Railway, under the name of the L. Zink Adjuster Company, is making an improved form of his cam type of shoe adjuster, which was first described in the Electric Railway Journal for Oct. 28, 1911. The adjuster shown in the first engraving can be used on any truck where the turnbuckle is now used to set the shoes. The adjuster is made of malleable iron with ribbed edges ¾ in. thick on the sides of jaws, thereby giving ample strength. Two ¾-in. x 3-in. machine bolts with O. K. nut locks clamp all parts together. The bolts used at the live and dead lever ends have a feather under the head which fits in the groove so that the bolt is not allowed to turn, thus stopping the wearing of holes, while a cotter key on the outside makes it impossible to lose the nut. Brakeshoe adjustment is obtained by applying the wrench bar in the square hole of the cam when the clamping bolts must be loosened. One round turn of the cam extends the live and dead lever pins 2¾ in. The cam can be locked by placing a ¼-in. cotter key in the holes on the outer edge of the cam, thus maintaining the adjustments made and also holding the release spring tension while the two ¾-in. nut-lock bolts are being tightened. The extended holes on each end of the adjuster take care of re-turned steel wheels to such a degree that each wheel

Radius Bar Connector



Cam Type Adjuster

can be turned down from 3½ in. to 4 in. without any change in the brakeshoe arrangement. No part of the adjuster is subject to wear, nor are any parts likely to become clogged with slush or ice. The adjuster is made in different lengths. It does not require a mechanic to handle it, nor are any bars needed in connecting the live and dead levers. This device has been in regular service for sixteen months on eight different roads.

The cut below shows this adjuster as made for short wheelbase double trucks and for single trucks. It has a

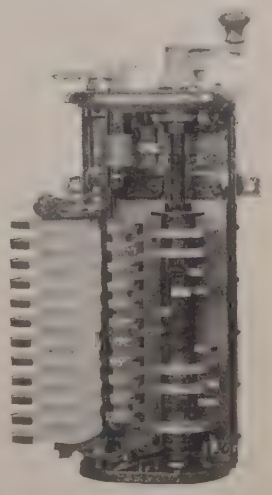
Adjuster for Short Wheelbase Truck

push and pull movement and is locked with two ⅜-in. bolts on the outside of the inner bar and through the slot. This makes a solid connection and prevents the shearing of the locking belts. This adjuster is best for trucks that have one live and dead lever and which can be connected under the springboard or pan.

The radius or circle bar connection shown in the upper illustration is used on double trucks which have a radius bar. There are two chilled rollers arranged to roll on the edge of the radius bar and two pocketed cone rollers on the top of the radius bar. This connection is fastened to the framework under the car with chains or rods as desired. Usually when a truck splits a switch other brake-rod connectors become jammed and the brake rod and brake rigging are torn off. These troubles are avoided with the radius-bar connection. In this case the truck will not swing around enough to jam or break the brake rod because of the movement of the rollers over the top or edge of the radius bar. A 6½-in. radius bar requires 2½-in. rollers and a 6-in. radius bar 3-in. rollers. Both pins in the end rollers or both live and dead lever pins in the brake-rod jaw must be lost to put the connection out of service. These rollers eliminate the need of lubricants on the radius bar.

## SIMPLIFIED CONTROL FOR LIGHT SERVICE

A simplified form of multiple-unit control, known as the Sprague-General Electric Type MK control, has been developed by the General Electric Company for city and interurban cars where a smaller and lighter equipment than the Type M is desired. Fundamentally, the new control consists of one or two master controllers, depending on whether single-end or double-end operation is required, and a main or motor controller. In operation the new control is "all-electric." The master controller, located on the platform, resembles the ordinary railway drum controller, except that it is very much smaller, and handles less than 2 amp per car; while the main controller, which includes the contactors, reverser and an overload relay all mounted in a single box under the car, handles the heavy motor current. The control and motor circuits are electrically independent. A multiple conductor cable carries the small control current to the operating magnet coils of the contactors of the main controller. These contactors have heavy contacts which close and vary the different motor and resistance circuits. Thus, the magnet coils of the contactors are actuated by line current and the magnets operate the power circuit contacts directly and with no intervening complications.

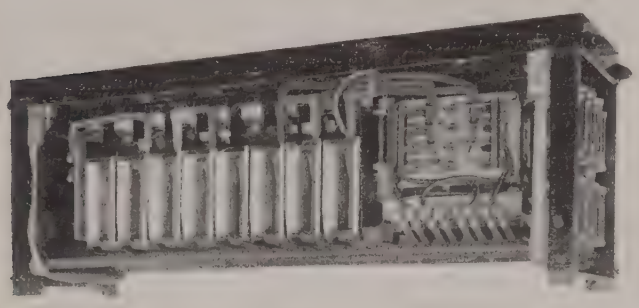


Type C-94A Controller

On account of the small size of the master controller, great economy in platform space is effected. The amount of current handled is so small that the parts are subjected to very little burning and consequently are relatively small. Each contact finger which breaks a circuit has an individual magnetic blow-out. A separate reversing handle, mechanically interlocked with the operating handle, is provided so that reverse connection can be made only when the operating handle is at the "off" position. Flexibility of operation is a noteworthy advantage of the new control. If it is desired to couple two or more cars during rush hours, control couplers are the only additional accessories required. The multiple conductor cable from the coupler socket is connected directly to the master controller fingers. Thus, energizing the proper wires by means of the leading master controller establishes similar motor connections on all cars simultaneously.

The contactors, overload relay, reverser, cut-out switches and resistance tubes for the control circuit are mounted in a single sheet-iron box with angle-iron frame and installed under the car, usually at one side where it

can be readily inspected. Not only is the motor current broken by the main controller when shutting off power normally, but in case of overload the circuit is opened by the contactors instead of by a separate circuit-breaker. Conduit inlets in the controller box permit all wires to



Contactor Box

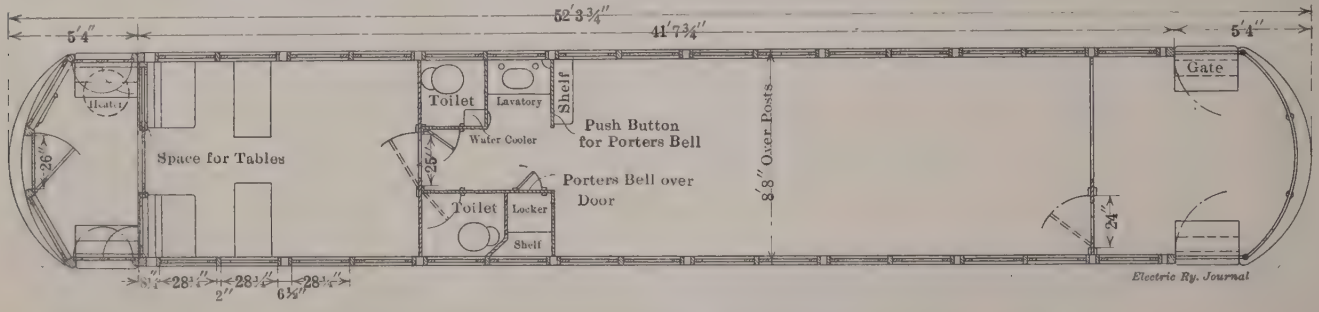
be run in conduit. As all the apparatus is thoroughly insulated from the casing, which is lined with insulating material, it is not necessary to insulate the box from the ground. The fact that the box is grounded affords protection to operators when inspecting the controller. The resistance tubes used in series with the magnet coils are located at one end of the controller and the terminal board for the control circuit cables at the other end. Removable covers on the sides, ends and bottom of the box provide ready access for inspection or repairs.

The contactors conform in design to the general type used for several years by the General Electric Company, but they are greatly improved in detail. A powerful magnet operates an arm fitted with a removable copper tip, which makes contact with a stationary tip. A box or chute of arc-resisting, insulating material surrounds the two tips, and a powerful magnetic blow-out is provided for disrupting the arc. The rolling motion which is imparted to the contact tips just after they touch is an advantageous feature, because in the final position clean surfaces are brought together. A heavy spring insures ample contact pressure for carrying the current and also forces the contact arm to snap out in opening the circuit when the operating magnet is de-energized. The contact pressure obtained is about four times that of the finger pressure in an ordinary cylinder controller of the same capacity and is applied instantaneously.

One of the principal improvements in these contactors is the form of magnetic blow-out and its accessories. The arc chute has a longer and deeper opening, and curved metal horns projecting from the contact tips are provided to allow the arc to be greatly extended without coming in contact with the insulating material. Through this means a single contactor is able to break repeatedly currents of several thousand amperes without excessive burning. Because of the peculiar design of the arc chutes, the arc is also forced to the center, preventing destructive burning of the sides. Owing to their exceptional arc-breaking capacity, only a small number of contactors are required, and the function of the circuit-breaker is performed by the overload relay opening the circuit to the contactor magnet coils. The various switches included in the equipment are the reset switch for again establishing connections in the control circuit after the overload relay has operated, a small cylindrical cut-out switch for cutting out one car in a train, motor cut-out switches and the master controller switch.

## OBSERVATION PARLOR CAR

The Fort Dodge, Des Moines & Southern Railway has recently received from the Jewett Car Company, Newark, Ohio, the observation parlor car shown in the accompanying illustrations. The car is 52 ft. 3¾ in. long over all and 8 ft. 8 in. wide over the posts. Both the vestibules in the motorman's platform and the bronze-railed open observation platform are 5 ft. 4 in. long. It will be noted, however, that the bulkhead of the car body at the observation end is set back the length of one car window, thereby giving additional space and affording a wind shelter in cold or rainy weather. The car, which is finished in best mahogany inlaid with fine white striping, is divided into a smoking compartment and a regular passenger compartment. Swing doors are provided at each end of the main compartment, the motorman's vestibule being furnished with a sliding door. The main compartment contains separate toilets for men and women, and also a porter's locker or buffet which is fitted with an electric stove for preparing hot lunches for passengers. The lavatories are supplied with hot and cold water.




Plan of Observation Parlor Car for Fort Dodge, Des Moines & Southern Railway

The floor is covered with high quality Brussels carpet and the rear or observation platform with inlaid rubber tile. Art glass gothics and deck lights are used. All other sashes, including storm sashes, are of plate glass. The lighting fixtures consist of elaborate four-light bronze chandeliers in the center of the upper deck with swinging fixtures along the sides. The car is also wired for the porter's bell and three electric fans. The seating consists of large armchairs which are of the standard parlor-car type.

Observation Car for Fort Dodge, Des Moines & Southern Railway

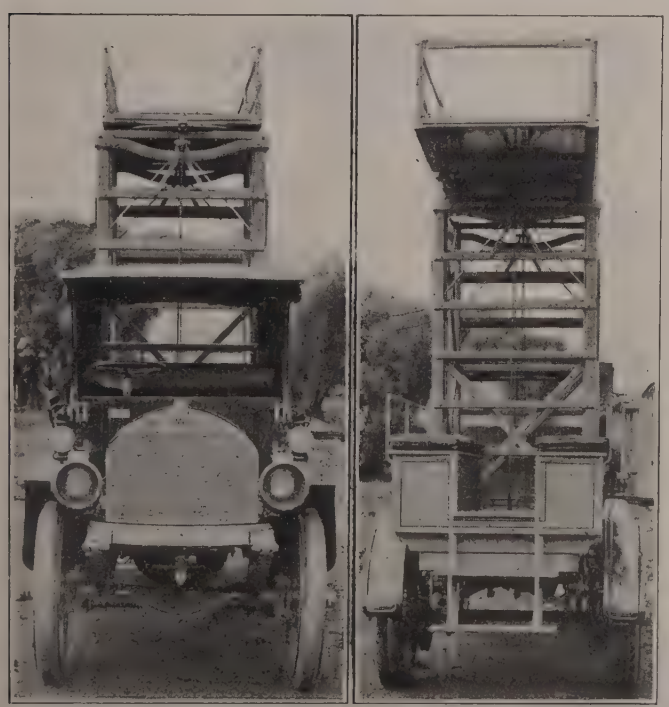
## TWO-TON GASOLINE TOWER TRUCK FOR OVERHEAD LINE SERVICE

The International Motor Company, New York, has recently furnished to the San Diego (Cal.) Electric Railway a gasoline tower truck which should prove interesting to electric railway officials who have hitherto considered the electric-driven tower wagon more adaptable and economical for their needs. The builders of this gasoline tower wagon believe, however, that its advantages, as hereinafter stated, may be found to outweigh considerably any superficial economy in operating cost which an electric vehicle may show because of cheap current.

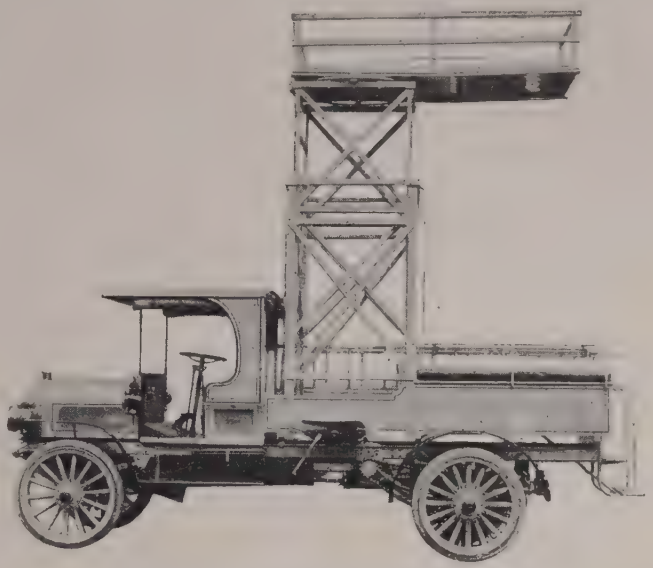
One great advantage of the gasoline wagon is its readiness at all times to respond to an emergency, as it is kept in order merely by keeping the gasoline tank filled, by lubricating the moving part of the chassis and by making periodical inspections of the mechanism as a whole. There are no losses of service time corresponding to that for battery charging.

In case the electric tower wagon is caught without its batteries charged when an emergency condition arises, say 25 miles away, a serious and costly delay may ensue before the wagon can reach the scene of the accident. Moreover, the gasoline truck possesses the advantage, which is of considerable importance to interurban and large city railways, of covering a wider area and of being adaptable for both long and short haulage service. For winter the gasoline truck is particularly advantageous because in heavy snow the electric truck has its normal radius of action very much reduced by the excessive consumption of current. Again, in a severe sleet storm it may be useless at the very time when its services are likely to be in the greatest demand.

The truck shown in the illustration is built on a standard Mack 2-ton chassis. The motor is a four-cylinder, four-cycle "L" type with the cylinders cast in pairs and the heads integral. The motor has three main bearings which are also connected with the rod bearing. The transmission is of the standard Mack selective clutch type operating on the non-sliding principle. A series of interlocking dogs throw the gears into the mesh to give any desired speed. The clutch is of the multiple-disk type controlled with a pedal and interlocking with an emergency brake. The honeycomb radiator is made particularly to withstand the excessive vibration due to the operation of the tower wagon over Belgian blocks. The normal speed of the tower wagon is 14 m.p.h. with provision for increasing this to 16 m.p.h. on good roads. The tower is of the well-known "Trenton" type. It is 42 in. wide inside, and the sprocket shaft operates back of the tower.



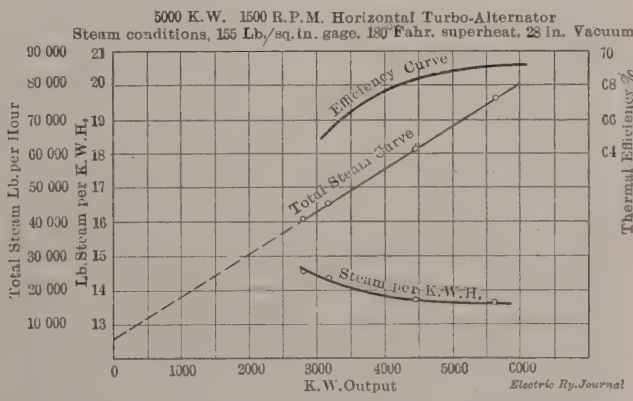
**Front and Rear Views of Gasoline Wagon as Equipped with Tower for Line Repairs**



**Side View of Gasoline Tower Wagon**

## EFFICIENCY OF A 5000-KW TURBO-ALTERNATOR

The accompanying set of curves was made up from tests taken of a 5000-kw Curtis turbo-alternator at the City Road station of the County of London Electric Supply Company, Ltd. The curves were furnished to the builder, the British Thomson-Houston Company, Ltd., Rugby, England, by C. P. Sparks, chief engineer of the supply company. These curves are of great interest as showing the low steam consumption per kw-hr. at different loads. At 4500 kw the steam consumption was 13.7 lb., and at 5600 kw it was 13.6 lb. per kw-hr. The thermal efficiency, which includes the generator losses, was 68.9 per cent at full load and more than 69 per cent at the overload indicated. These figures are considered particularly good for a turbine of 5000-kw capacity as the superheat is not as high as is generally the case when efficiencies as high as those quoted are obtained.




**Test Curves of London Turbo-Alternator**

# ELECTRIC RAILWAY LEGAL DECISIONS

## CHARTERS, ORDINANCES, FRANCHISES

**Illinois.**—Rates—Regulation—Reasonableness.

Complainant operated a railroad within the city of Belleville, charging 5 cents fare within the city limits, whereupon the city arbitrarily extended its limits along the line of complainant's road through a strip of territory leading to another town not fully built up and then attempted to extend the 5-cent fare from the old limits of the city through the annexed strip. The railroad company's property was valued at $650,000. Its average yearly receipts under the regulation would be $122,313.86 and operating expenses $99,310.73, leaving a net return of $23,003.13, which, after deducting 3 per cent for depreciation, would leave for distribution among stockholders $3,503.15. Held, that such regulation was invalid for unreasonableness. (East St. Louis & Suburban Ry. Co. v. City of Belleville, 193 Fed. Rep., 95.)

**Kentucky.**—Interstate Commerce — Heating — Reasonable Regulations.

Regulation by a municipality of a street railway which was operated by a state corporation and carried passengers only to the state line where they were delivered to a foreign corporation is not an interference with interstate commerce.

A municipal ordinance requiring the weekly fumigation of street cars and that they be kept at a temperature of not less than 50 deg. Fahr. is not an unreasonable requirement in favor of public health.

A municipal ordinance providing that it is the duty of all street car companies to operate cars in sufficient numbers reasonably to accommodate the public, when interpreted with the common-law rule that it is the duty of a common carrier to provide reasonable accommodations for such passengers as in the exercise of ordinary care can be anticipated, is not unreasonable. (South Covington & C. Ry. Co. v. City of Covington, 143 So. W. Rep., 28.)

**Kentucky.**—Crossing Railroad Tracks—Contract Rights.

A street railway corporation which desired a crossing over a railroad entered into a contract with the railroad and secured it. The street railway company then became insolvent, and a new company purchased its assets, receiving a new franchise from the municipality in which it operated. Held that, despite the new franchise, its rights were fixed by the original contract under which it succeeded to the crossing. (Louisville & N. R. Co. v. Central Kentucky Traction Co. et al., 144 S. W. Rep., 739.)

**Kentucky.**—Franchises—Obligations Incurred—"Bonus."

A city granted two street railway franchises, one for twenty-five years, calling for a payment of $250 a year as bonus, and the other providing for an annual license tax on cars used. Subsequently it adopted an ordinance, accepted by a company owning both franchises, which required the company to pay an annual sum in instalments in June and December, in lieu of its obligation to repair streets. Pending litigation to determine its rights under the franchises, the company contracted to pay the city $2,500 annually for five years and additional sums annually for subsequent five-year periods, these payments to be in lieu of car license or bonus. It also agreed to make specified improvements. Held, that the payments required by the last contract were in lieu of payments required under the original franchises or the ordinances, the word "bonus" being used as equivalent to "consideration." (City of Covington v. South Covington & C. St. Ry. Co., 144 S. W. Rep., 17.)

**Louisiana.**—Movable Partition to Indicate Separate Accommodations for Races.

Act No. 64 of 1902, requiring street railway companies to provide separate accommodations for the white and colored races, is properly interpreted to mean that the position of the movable partition in a car may be changed as occasion may require, that is to say, should it be found that at a particular time more space is assigned to the one race and less to the other than is needed for the accommodation of the respective classes of passengers, the officer in charge of the car may move the partition to meet that condition and may require the passengers to move their seats accordingly. But where a passenger has found a seat in the compartment assigned to his race the officer has no right, by moving the partition, to put him in the wrong compartment when there is no seat to be found in the compartment thus newly established for his race. (Alexander v. New Orleans Ry. & Light Co., 57 So. Rep., 283.)

**Oklahoma.**—Corporate Powers.

A corporation formed under the general laws of the State, in pursuance to Sec. 1408, Compiled Laws of Oklahoma 1909, with the power to use electricity for the propulsion of its cars and rolling stock, in addition to the powers exercised by railroad corporations generally, may, with the consent of the authorities of any city or town in the State of Oklahoma located upon or along its lines, construct a system of street railways upon such streets and upon such terms and conditions as may be agreed upon between such corporations and such city or town and may also accept lighting contracts with such cities or towns to supply the said cities or towns or the inhabitants thereof with light or electric current for power. Such railways or such corporations may also acquire, by purchase or consolidation, plants, franchises, contracts, good-will and other property of any existing street railway or lighting company, as provided by Sec. 1409, Compiled Laws of Oklahoma 1909. (Overholser et al. v. Oklahoma Interurban Traction Co., 119 Pac. Rep., 127.)

**Oregon.**—Contracts Against Public Policy—Stop Discontinuances.

Where the enforcement of a contract will inconvenience the public, equity will refuse to enforce it in the exercise of its discretionary power. The rule is frequently applied to contracts by a railroad company to stop its trains at certain places. (Ford v. Oregon Electric Ry. Co., 117 Pac. Rep., 809.)

**Pennsylvania.**—Local or Special Laws—Classification of Cities.

Act June 7, 1907 (P. L. 453), regulating the rate of fare for transportation of passengers by street railway companies in cities of the second class, does not relate to the exercise of the corporate powers or to the corporate officers of cities of the second class, nor regulate the municipal affairs of such cities and hence is not a subject for which cities may be classified, and as the act applies to street railways located in but two cities of the State it is unconstitutional as special and local legislation. (Ashworth v. Pittsburgh Rys. Co., 80 At. Rep., 981.)

**Washington.**—Eminent Domain—Rights Acquired—"Public Interest"—"Public Use."

Property acquired by eminent domain cannot, unless absolute fee has passed, be devoted to any other purpose than that for which it is taken, but it will not revert to the former owner unless the condemning corporation has finally ceased to apply it for a public use.

Where a railroad condemned land for public use and rented it to a wholesale grocery company, the use of the land by the grocery company was not a public use, for while it might be a public benefit or public interest, no obligation rested upon the grocery company to conduct its business for the benefit of the public. The true criterion of a public use is whether the public may enjoy it by right or by permission only, and the terms "public interest" and "public use" are synonymous. (Neitzel et al. v. Spokane International Ry. Co. et al., 117 Pac. Rep., 864.)

**Wisconsin.**—"Passenger"—Existence of Relation—Assault in Ejecting Person from Car—Scope of Employment.

One does not need to have paid his fare, or even to have entered a carrier's car, to become entitled to the rights of a passenger. If he has entered the carrier's station with good faith and intent to take passage and ability to pay his fare, he becomes a passenger, and if he has boarded a car prepared and willing to pay his fare in case he could not obtain a free ride, the fact that he asks for a free ride does not deprive him of his character as a passenger. It is a refusal to pay fare on proper demand or the entry upon a car with intent not to pay which has such effect.

It is the duty of the conductor of a street car to eject persons who refuse to pay fare, and if in his endeavor to carry out such duty he makes a wrongful assault upon a person, such course is within the scope of his employment, though not authorized by his master, for which the master is liable. (Lugner v. Milwaukee Electric Ry. & Light Co., 131 N. W. Rep., 342.)

## LIABILITY FOR NEGLIGENCE

**Alabama.**—Collision with Vehicles—Negligence—Burden of Proof.

Under the express terms of Code 1907, Sec. 5476, the burden is on a street railway company in an action against it for a collision with a vehicle, to show that the company was not negligent. (Birmingham Railway, Light & Power Co., v. Demmins, 57 So. Rep., 404.)

**Georgia.**—Stock Guards—Failure to Repair.

A landlord cannot recover in a suit for damages against a railroad company for failure to keep in good repair a stock guard, where the sole damage alleged is to the crop of a tenant. (Louisville & N. R. Co. v. Nanny et al., 73 S. E. Rep., 1052.)

**Indiana.**—Frightened Horse—Wilful Misconduct.

A complaint in an action for injuries to a traveler caused by his horse becoming frightened at an interurban car and running away, which alleges that the operators of the car wilfully and maliciously to frighten the horse caused the whistle on the car to blow suddenly and that they maliciously pursued the horse by increasing the speed of the car with the knowledge that plaintiff was unable to control the horse and avoid the injury, states a cause of action for wilfulness as against a demurrer. (Ft. Wayne & Wabash Valley Traction Co. v. Miller, 96 N. E. Rep., 496.)

**Indiana.**—Safe Place to Alight.

The rule which requires only ordinary care of railroad carriers in maintaining safe places for the ingress and egress of passengers to and from their trains at regular stopping places does not apply to the obligation imposed on a street railway company requiring a passenger to alight from a car to board another to complete her journey because of excavations of the track and street, the obstructions of the street, the stopping of the car in the middle of the street, the condition of the place of alighting and the requirement of the passenger to alight being brought about by the company. (Louisville & S. I. Traction Co. v. Walker, 97 N. E. Rep., 151.)

**Indiana.**—Master and Servant Negligence.

An employer must exercise ordinary care to furnish an employee a safe place to work and exercise ordinary care to keep it in that condition, but he is not liable to an employee for the negligence of co-employees in the details of the work, such as the negligent use of appliances or negligent failure to use them or negligent operation of machinery in such a way as to occasion injury to another employee.

A motorman operating a car on a main track of the company and employees engaged in moving an interurban car of another company from the shops of the former company to the main track are fellow servants, and the former company is not liable at common law for injuries to the motorman caused by the negligence of such employees. (Indianapolis Traction & Terminal Co. v. Mathews, 97 N. E. Rep., 320.)

**Iowa.**—Care Required at Crossings of Steam Railroads Protected by Flagmen.

A motorman of a street railway is not excused from the exercise of the highest degree of care in crossing a railroad track merely because a flagman is stationed at that crossing. (Parker v. Des Moines City Ry. Co., 133 N. W. Rep., 373.)

**Iowa.**—Injuries to Passenger Who Entered Prepayment Car by Wrong Passageway.

A passenger boarded a "pay-as-you-enter" car by the passageway intended for the egress of passengers. The conductor caused the passenger to stop before reaching a place of safety after signaling the car to start and thereby imperiled the passenger's safety and caused her to be thrown from the car. Held, that he was guilty of actionable negligence. (Boice v. Des Moines City Ry. Co., 133 N. W. Rep., 657.)

**Kansas.**—Defects in Viaduct Maintained by Company.

A city ordinance granted to a street railway company the right to construct, maintain and operate its railway over a viaduct forming a part of a street in the city. One of the conditions was that the railway company should repair and maintain in good condition and safe for public travel all parts of the viaduct. The ordinance was accepted, and the railway was constructed and operated. A sidewalk forming a part of the structure, but not the part used by the railway company, was suffered to become out of repair and unsafe for use, in consequence of which the plaintiff, while traveling on the sidewalk, was injured. Held, the plaintiff may recover directly from the railway company the damages resulting from the injury. (Jenree v. Metropolitan St. Ry. Co. et al, 121 Pac. Rep., 510.)

**Kentucky.**—Master and Servant—Injury to Volunteer—Emergency Employee.

Plaintiff, an interurban railway conductor employed by defendant, was ordered to take a car to V. at 11 p. m. on the night of the accident and to return to L. that night on an extra following his car. While returning, the motorman of the extra became sick and requested plaintiff, who, though a conductor, had some experience in operating cars, to operate the car for him. Plaintiff did so at short intervals until they reached the place where the motorman lived, when, by agreement between them, the motorman alighted, and plaintiff ran the car on toward the carhouse, but before he reached the carhouse he ran into certain cars alleged to have been negligently left on the track, and was seriously injured. Held, that plaintiff in operating the car was a mere volunteer, unless he was an emergency employee, which question depended on whether the motorman was in fact too sick to operate the car. This was a question for the jury and not for plaintiff to determine, so that an instruction "that if plaintiff believed, or had reasonable grounds to believe, that the motorman had become and was too ill to operate the car, etc.," was erroneous. (Central Kentucky Traction Co. v. Miller, 143 S. W. Rep., 750.)

**Michigan.**—Personal Injuries—Insults by Employees.

Where a passenger's commutation book containing accommodation tickets was erroneously indorsed on its outside cover as void after "June 9," and each coupon was stamped on its back "June 9," but on the inside of the front cover the days of the month and year were printed in a position to permit punching out the date of expiration and this date was correctly punched out as of July 9, the conductor was bound to examine the tickets carefully and could not justify an offensive refusal of the book by the rule that a ticket is conclusive evidence as between conductor and passenger. (Humphrey v. Michigan United Rys. Co., 132 N. W. Rep., 447.)

**New York.**—Stations—Approaches.

Where the sidewalk of a carrier around its station, which gave an ample entrance and exit, was of concrete and there were grass plots between the sidewalk and the street, the carrier was not bound to secure the safety of a beaten path across these plots which did not belong to the carrier but was occasionally used by patrons of the railroad company Hence it was not liable for the act of third persons in the stringing of a wire across the path. (Clyde v. Brooklyn Union Elevated R. Co., 133 N. Y. Sup., 1.)

**New York.**—Defect in Equipment of Through Car—Negligence of Initial Road.

A carrier sold a coupon ticket to a point beyond its own lines, the coupon providing on its face that the initial carrier in selling the ticket was acting only as agent for the connecting carrier and assumed no risk beyond its own line. While upon the connecting line the car which the initial carrier furnished and which ran through caught fire, owing to some defect in its electrical equipment, and a passenger was injured. Held, that it was the duty of the initial carrier to furnish a safe and properly equipped car, of which duty it was not relieved by the arrangement between itself and the connecting line and for the negligent breach of which duty it was liable. (Brook v. Brooklyn Union Elevated R. Co., 133 N. Y. Sup., 254.)

**Ohio.**—Master and Servant—Inspection of Wall Bolt.

Where a lineman was injured by a cross-wire lug pulling out from the wall of a building from the weight of the cross wire against which plaintiff was leaning his weight, evidence held to require submission to the jury of the question whether defendant was negligent in failing to make an inspection of the lug to discover the method and security with which it was fastened to the wall. (Bush v. Cincinnati Traction Co., 192 Fed. Rep., 241.)

## LONDON LETTER

*(From Our Regular Correspondent)*

The Belfast Corporation has decided to introduce a universal penny fare on the municipal trams. The proposal to introduce halfpenny fares was defeated. Passengers will be carried 3 miles, 4 miles and 5 miles in the future for a penny, making the fares among the cheapest in the United Kingdom. The result of the employees' profit-sharing scheme introduced two years ago by the Belfast Corporation has been announced. The amount available for distribution for the last year was £2,800. Each of the 800 tramwaymen, in addition to his regular wage, received £4 1s. 2d. Every member of the staff who had been in the service a full year on March 31, 1912, received the same amount. Mr. Nance, the general manager, considers that the scheme gives the employees a strong personal interest in the success of the undertaking and he anticipates good results from the execution of the plan.

The pay-as-you-enter system has been duly inaugurated on the Bensham and Saltwell routes of the Gateshead & District Tramway, as noted elsewhere in this issue. This system seems to be destined to make satisfactory progress in Great Britain, as many of the other corporations are seriously considering the use of prepayment cars. The question has been considered at Manchester, but as the lines there are from 8 miles to 10 miles long, Mr. McElroy does not see any possibility of the adoption of the system until the question of graded fares has been settled. Glasgow is also considering the use of prepayment cars, but the same difficulties as at Manchester in regard to fares exist in that city.

The Tramways & Light Railways Association held a very successful meeting at Swansea in June. The headquarters of the association were at the Langland Bay Hotel, Mumbles. The delegates and their friends were received by the chairman of the Swansea Improvements & Tramways Company at the pier at Mumbles. The following papers were read and discussed: "The Respective Values of Tramways, Motor Buses and Railless Traction as Means of Transport," by A. H. Pott, chief engineer of the Metropolitan Electric Tramways, Ltd., and "How to Secure the Best Results from Car Meters," by William Clough, general manager of the Bury Corporation Tramways. Luncheon was provided by the Swansea Tramways. The delegates were taken into the Gower Peninsula, and on the return tea was served at the Langland Bay Hotel. In the evening the Mayor and Corporation of Swansea tendered a banquet to the delegates at the Metropole, Swansea. On the second day the following papers were read and discussed: "Track Maintenance," by William Thom, general manager of the Potteries Electric Traction Company, Ltd., and "Pay-as-You-Enter and Its Advantages to Tramway Companies and the Traveling Public," by Henry M. Howard, member of the association. The members of the party were afterward entertained at luncheon at Swansea by the harbor trustees of Swansea. Excursions were made to neighboring points of interest and an opportunity was afforded the delegates to visit the tramway power station. A banquet followed at the Langland Bay Hotel, Mumbles, tendered by the British Electrical Federation.

In view of the discussion which followed the reading of A. H. Pott's paper at the meeting of the Tramways & Light Railways Association just referred to, it was interesting to note that while the trackless trolley system was favored by Mr. Hamilton, the general manager of the Leeds Corporation Tramways, Mr. Rogers, of the Newcastle Tramways, referred to the fact that in the Newcastle bill the application for trackless trolley powers was covered by the corporation seeking powers for motor buses. When the matter came before the committee even Mr. Hamilton failed to secure the passage of the trackless trolley clauses. Mr. Rogers quoted figures to show that the motor bus is cheaper than the trackless trolley, and stated that the Newcastle Corporation was satisfied with its experience with the electric motor bus and did not intend to fall back on any trackless trolley. Mr. Garcke, of the British Electrical Federation, expressed the opinion that considerable progress would be made in automobile engineering in the next few years and said that the tramway companies would be the first in the field to add motor buses as feeders to the tramways.

The select committee of the House of Lords which has been dealing with the bill of the London Electric Railway has found the preamble proved and has ordered the bill as amended to be reported for third reading. The most important of the unopposed projects in this bill is the construction of a new underground tube from the authorized terminus of the Baker Street & Waterloo Railway at Paddington to Queen's Park Station, where it will connect with the London & Northwestern Electric Railway, which is being completed from Euston to Waterford. The bill also provides for the construction of the railway from Golder's Green, its present terminus, to Edgware, as an extension of the Charing Cross, Euston & Hampstead Railway. There will probably be three stations on the Paddington-Queen's Park section of the railway and in each case communication with the surface will be by moving stairways and not by elevators. The estimated cost of the railway from Paddington to Queen's Park is £710,900.

In order more effectually to meet the motor omnibus competition in London, the highways committee of the London County Council is considering the reduction of fares and has instituted return fares on certain sections of its lines on the south side of the river. On most of these sections the single fare is 2d. and the return fare 3d., so that 1d. is saved by those who take return tickets.

The London County Council has completed the construction of the new tramway bridge over the King's Cross railway station of the Metropolitan Line. The opening of the bridge creates a through route from Holborn to Holloway, Finsbury Park and the northern suburbs. Hitherto passengers have had to change at King's Cross and walk to the foot of Caledonian Road. The trams could not be carried round the severe curve at King's Cross from Gray's Inn Road into Pentonville Road and the curve from Pentonville Road into Caledonian Road. The work has occupied about a year, but the Metropolitan Company has maintained its full service of trains on the railway underneath.

The annual accounts of the tramways undertaking for the last financial year are summarized in a report of the finance committee of the London County Council. Up to March last £12,193,648 had been spent on the tramway undertaking, but of this £2,423,000 had been paid off, leaving a net debt of £9,500,000. The revenue last year was £2,356,181, and the surplus was £934,121. The available surplus, after meeting the charges for interest, repayment, etc., was £222,703, this being £10,024 less than the previous year's balance. The traffic receipts averaged 10.98d. per car mile, or, with advertisement and other receipts, 11.29d., as against 11.28d. in 1910-11, 11.48d. in 1909-10, and 11.81d. in 1908-9. The expenses were 6.63d. per car mile, as against 6.48d. for the previous year. The previous year, including debt charges for power, the total expenses were 7.31d. per car mile, as compared with 7.16d. a year ago. Last year the surplus was 4.66d., as compared with 4.80d., 5.06d., 5.07d. and 5.16d. in the four preceding years. A report submitted by the highways committee states that in one respect the tramways at present are at a disadvantage. It is not possible on some of the routes to carry passengers through to their destination. The tramway system now comprises 132 miles of road.

Contracts for the construction of a trackless trolley between Holcombe Brook and Edenfield will shortly be made by the Ramsbotton Urban District Council. The route is to be 3½ miles long and the cost is estimated at £10,000, which includes the installation of three cars, overhead fittings, waiting rooms and car sheds.

The Lanark County tramways bill has been passed as an unopposed private bill by a committee of the House of Lords. The purpose of the bill is to "authorize the County Council of Lanark to construct tramways in the county of Lanark, and to authorize the County Council and the Town Councils of Hamilton, Motherwell and Wishaw to acquire the undertaking of the Lanarkshire Tramways Company." The bill was formerly opposed by the company, but terms have been arranged. If within two years after the construction of lines proposed in the bill the undertaking of the company is not purchased under the terms of the bill, the company will have power to acquire the new lines.

A. C. S.

# News of Electric Railways

### Boston-Providence Electrification Plans

T. E. Byrnes, vice-president of the New York, New Haven & Hartford Railroad, is quoted as follows in regard to the plans for the electrification of the main line of the company between Boston and Providence, referred to in the Electric Railway Journal of July 27, 1912, page 133:

"The assumption appears to be general that, in planning to electrify, the management of the New York, New Haven & Hartford Railroad is keeping a promise made to the Legislature. This is misleading. The fact is that the New Haven management decided some time ago that the road ought to be electrified, but was met with the condition in the lease of the Boston & Providence Railroad to the Old Colony Railroad that all improvements should be financed by the lessee company.

"It was unreasonable to expect the Old Colony Railroad to expend $7,000,000 in electrifying and four-tracking the Boston & Providence Railroad, and the management of the Boston & Providence Railroad, appreciating the situation, asked the Legislature for authority to finance the improvement. In 1911 the 'Big Four' commission recommended legislation under which the Boston & Providence Railroad might finance its own improvements, and after two years of discussion such legislation was passed. It is by virtue of this legislation that the management of the New York, New Haven & Hartford Railroad now proposes to act.

"The recent legislative enactment under which the directors of the New York, New Haven & Hartford Railroad voted to act requires in effect a modification of the lease of the Boston & Providence Railroad to the Old Colony Railroad, and, in turn, a modification of the lease of the Old Colony Railroad to the New York, New Haven & Hartford Railroad.

"The New York, New Haven & Hartford Railroad has made the necessary appropriation for the engineering plans, and the work on those plans is under way, but until the stockholders meet and act in October and November the securities cannot be placed and the actual work of construction cannot begin."

### New York Central-Oneida Railway Lease.

The Public Service Commission of the Second District of New York has authorized the New York Central & Hudson River Railroad and the Oneida Railway to enter into a lease or agreement for the exercise by the Oneida Railway of trackage rights in joint use with the New York Central & Hudson River Railroad of that portion of the West Shore Railroad right-of-way and tracks between Genesee Street, Utica, and the east line of Syracuse, a distance of 46.6 miles, with necessary passing sidings.

The grant is made for thirty years from July 1, 1912, and a clause provides for renewal of the lease for another term of thirty years, subject to the approval of the commission. Approval is given at this time on the condition that it shall not at any time or place be construed to impair or modify in any respect any power or right of supervision which the commission now possesses over the property or which may hereafter be conferred upon it or any other legally constituted body of the State of New York.

The companies originally asked for the approval of an agreement providing for a term of 475 years, the remaining time of the West Shore lease, but the commission refused to approve for this term of years, and the lease which it now approves for a term of thirty years was later submitted to the commission.

The approved lease provides that the New York Central & Hudson River Railroad shall grant the Oneida Railway trackage rights for its interurban passenger and express service, with joint use of the two main tracks of the West Shore Railroad between the points mentioned; also grants to the Oneida Railway the joint use of West Shore Railroad's passenger stations, and the right to place and maintain a transmission line and such track installations and connections as may be necessary for the electrical operation of cars of the Oneida Railway over the West Shore Railroad between the points referred to. The Oneida Railway is not to be entitled to the use of the property to an extent greater than 50 per cent of its capacity.

The Oneida Railway is to pay to the New York Central Railroad upon the execution of the agreement, as compensation for the use of the property to the date of such agreement, $90,000 and is to pay to the New York Central Railroad as compensation for the rights granted to it $130,000 per annum, payable quarterly, and also pay quarterly its proportion, on the basis of use, of interest at the rate of 6 per cent per annum on all expenditures made by the New York Central Railroad for additions to the joint property other than for signals. The annual rental may be readjusted by mutual agreement, and if the companies fail to agree arbitrators may be appointed.

### Electric Railway Tax Values in Ohio

The tentative valuations of the electric railways in Ohio announced by the State Tax Commission show substantial increases, although the values were all consdered high last year. In the case of the Cincinnati Traction Company the commission named $18,516,000 as compared with $18,123,000 a year ago. Representatives of the company argued against the proposed increase before the board on July 18.

July 30 was set as the date for the company to submit a final statement.

The property of the Ohio Electric Railway has been valued at $14,493,000, as against $12,241,000 in 1911. A supplementary and explanatory statement will be prepared by the company before the proposed valuation is made final. Tentative valuations of some of the companies for 1911 and 1912 follow:

Dayton, Covington & Piqua Traction Company, 1911, $418,000; 1912, $528,000.

Dayton & Troy Electric Railway, 1911, $899,000; 1912, $922,000.

Dayton, Springfield & Xenia Southern Railway, 1911, $375,000; 1912, $407,000.

Ohio Traction Company, 1911, $750,000; 1912, $828,000.

Oakwood Railway, Dayton, 1911, $500,000; 1912, $500,000.

City Railway, Dayton, 1911, $2,343,000; 1912, $2,675,000.

Dayton Street Railway, 1911, $325,000; 1912, $355,000.

People's Railway, Dayton, 1911, $1,535,000; 1912, $1,685,000.

### Denver Flood Damage

The property loss to the Denver (Col.) City Tramway in the storm of July 14, 1912, which resulted in the flooding of Cherry Creek, was not great, but considerable inconvenience was experienced and heroic measures had to be resorted to in several cases to repair damages and resume service. Cherry Creek has long been one of the curiosities of the city. It flows through the heart of the city and has been permitted to keep its course heretofore because of the memories of the early days of the city that were associated with it. The banks of the stream have been improved from time to time, but the waterway has been of little use commercially. Still the creek was never regarded as particularly harmful. The city officials have now decided to divert its waters into Land Creek above the city limits and so conduct them to the Platte River, 4 miles below. It is estimated that this work will cost not more than $600,000. The following extracts have been made from an article on the flood which appeared in the July issue of the *Tramway Bulletin* of Denver, published in the interest of the employees of the Denver City Tramway:

"About 4 o'clock in the afternoon of July 14, 1912, a cloudburst struck Denver. The transportation department was hard hit. The heavy downpour washed tons of sand and mud upon the tracks of nearly every line on the system, and to add to the general unpleasantness of things every telephone connection, both from the outside and the dispatchers' system, had gone out. Several lines were tied up.

"The Argo line was one of the worst affected. There were no cars on this line from the time the storm was over until midnight. Division Superintendent Charles Port, together with fifteen men, two cars and a four-horse grader, had charge of this particular section. South Gaylord was blocked at Downing and Alameda with two feet of sand.

"About 8 o'clock in the evening the flood came down Cherry Creek. Bridges were weakened by tons of débris striking them and the water, overflowing the banks, inundated the territory for blocks on either side of the channel. The closer to the heart of the city the flood came, the more extensive was the territory covered.

"Every line crossing bridges was then affected. Cars were kept off bridges all night. So high did the water rise from Market Street to the Platte River that car service across the Sixteenth Street viaduct had to be suspended, and the Platte Street line was abandoned.

"The storm and flood combined kept the entire system out of service approximately one hour and thirty minutes. The Eleventh Avenue bridge was not used until Monday afternoon and the Downing Street bridge is still out of service, one-half of the south abutment having been wrenched away by the flood. All other bridges were used Monday morning.

"Although sixty cars were put out of service by the storm and flood, the transportation department overcame the disaster and succeeded in putting out a service on every line of the system Monday morning. The fact that the company is operating over 100 standard trailers made it possible for service to be rendered Monday morning. Had it not been for these trailers Denver's citizens would have been confronted with a very limited street car service.

"Twenty-eight cars were in the central division carhouse when the flood reached Thirteenth and Arapahoe Streets. So rapidly did water pour into the Thirteenth Street entrance to the carhouse that three men at work there had to be pulled out by ropes. The chief engineer of the building, James H. Dean, by rare presence of mind and quick work succeeded in disconnecting the building lighting system and switching on the current of the Denver Gas & Electric Company. This act made it possible for lights still to burn in the building. The damage to the engine room is considerable. Motors will have to be baked, the stokers were filled up, the elevators put out of commission, and it is feared that the setting of the boilers is damaged. The stationery and store room, adjoining the engine room, was flooded. Fortunately, no valuable records were stored there, they being kept in another part of the building. The damage to the stationery and supplies will, however, total several thousand dollars.

"The twenty-eight cars that were in the carhouse when the water rushed in were inundated up to the windows. The damage to the motors, air-brake systems, heaters, seats, etc., will approximate $200 per car. Ten thousand dollars' worth of car materials were in the barn, and W. H. McAloney, superintendent of rolling stock, estimates that 60 per cent of this was rendered useless. The material bins were damaged to the extent of $500. Thirty-two more cars, making a total of sixty put out of commission by the water, had motors damaged in service by running through long stretches of water, which, in most cases, reached the car floors. The monetary loss on each one of these will total in the neighborhood of $200.

"At the present time it is almost impossible to estimate the damage caused by the flood at the Platte Street power house. On Sunday afternoon the heavy rain caused a short-circuit on the a.c. bus in the transformer house. This necessitated the shutting down of all the a.c. generators and the lines feeding the substations. This was repaired, temporarily, and the substations again placed in service about 6 p. m. At 10 p. m. the water had risen to such a height in the Platte River that it overflowed the banks and flooded the entire basement of the plant. All the motors driving condenser pumps, coal crusher and other auxiliaries were flooded and out of commission at 11 p. m. By active work and the use of pumps, the d.c. units were kept in operating condition, and by 6 a. m. Monday the company was able to start one a.c. unit. This permitted the operation of Colfax and Broadway substations, and at 4 p. m. by the temporary installation of a motor on No. 6 turbine condenser that unit was started and all the substations put in service.

"The most serious delay was caused by the flooding of the coal crushers and motors. The motor on the coal crusher at the east end of the plant was taken out and a spare motor put in its place. As the crusher and motor under the dump hopper were covered by 10 ft. to 12 ft. of water, all the coal for the plant had to be shoveled into the lower crusher. Considering the fact that the coal consumption averages about 250 tons a day, this was no small undertaking, especially in view of the fact that all damaged apparatus must be removed and thoroughly overhauled as quickly as possible.

"The only damage done to tracks by the flood was washing out 27 ft. of roadbed south of Downing Street bridge, while the labor of cleaning up will not exceed $500."

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**New California Road in Partial Operation.**—The Tidewater & Southern Railroad has been placed in operation between Modesto, Cal., and the Stanislaus River.

**Change from A.C. to D.C. Operation by Pittsburgh & Butler Street Railway.**—The Pittsburgh & Butler Street Railway, Butler, Pa., has decided to substitute 1200-volt direct-current operation for its present alternating-current system.

**Permanent Public Utilities Commission Proposed for Cincinnati.**—At a meeting of the committee on public utilities of the City Council of Cincinnati, Ohio, on July 25, 1912, Chairman Sawyer suggested the appointment of a local public service commission, with authority over all the utility companies which operate in the city.

**Another Power Contract at Cleveland.**—Following the example of the Cleveland (Ohio) Railway, the Cleveland & Eastern Traction Company has closed a ten-year contract with the Cleveland Electric Illuminating Company for the power needed to operate its line above that furnished by its own plant. The company operates 39 miles of track.

**Proposed Franchise Extension Ordinance in Saginaw.**—The Council of Saginaw, Mich., has voted to extend the franchise of the Saginaw-Bay City Railway from 1923 to 1942 in return for concessions from the company, which include the expenditure of $200,000 in local improvements. The new grant will be submitted to the voters for their approval.

**Chicago Councilmen to Inspect Subways in Boston, Philadelphia and New York.**—In order that the work of preparing plans for the independent subways in Chicago, Ill., may be pursued along the lines of best practice, eight representatives from the local transportation committee of the Chicago City Council and one representative from the Harbor and Subway Commission have arranged to inspect the subways in Boston, Philadelphia and New York.

**Recommendation Adopted Proposing Inventory in Los Angeles.**—The City Council of Los Angeles, Cal., has adopted the report of the special railroad committee of the Council recommending that the Board of Public Utilities be provided with a fund to ascertain the value of the physical property of the Los Angeles Railway Corporation and the value of its franchises preparatory to negotiating for the purchase of the company's system by the city.

**Cost of City's Inventory of Metropolitan Street Railway.**—L. R. Ash, city engineer of Kansas City, Mo., who is to have charge of the inventory of the property of the Metropolitan Street Railway for the city, has notified Mayor Jost that to do the work satisfactorily the services of two experts and a large corps of clerks and assistants will be necessary. He estimates that the cost of the work will be $20,000 and that it will take sixty days to complete the inventory.

**Traffic Regulation in Toronto.**—At the last meeting of the Police Commissioners of Toronto Chief Grasett was asked to communicate with Police Commissioner Waldo of New York City to ascertain the conditions under which it would be possible to have two of Toronto's policemen frequent with the New York traffic squads the busiest street intersections in New York so as to study how the traffic is handled and report their observations for the benefit of Toronto. They will study particularly the effect of traffic regulation on street railway operation.

**The Nation's Business.**—The Chamber of Commerce of the United States, of which Harry A. Wheeler, Chicago, Ill., is president, will begin publishing *The Nation's Business* on Sept. 2, 1912. This periodical will be distributed from Washington to the editorial writers of the nation and to the constituent members of the National Chamber of Commerce. It is intended to furnish a survey of the constructive progress of the nation along lines of agriculture, mining, manufacture, transportation, distribution and finance. It will include statistical statements of development and cover the bureaus of the government departments that are related to business and commercial activities at home and abroad. The permanent headquarters of the Chamber of Commerce of the United States were opened on July 22, 1912, in the Riggs Building. The rooms will be at the disposal of all visiting members of the constituent organizations.

**Insuring Continuity of Power Service in Toronto.**—Representatives of the Toronto Power Company, the Toronto Light Company and the Toronto Railway conferred with representatives of the city of Toronto, the Toronto Board of Trade, the Canadian Manufacturers' Association and the Civic Hydroelectric Commission recently in regard to methods to be adopted to avoid the consequences which follow the failure of Niagara power. The companies have promised to tie together the auxiliary steam plants of the Toronto Railway and the Toronto Electric Light Company and to complete the duplicate transmission line from Niagara Falls to Hamilton in three months. P. H. Phippen, K. C., said that most of the trouble in transmission from Niagara occurred between Hamilton and Niagara Falls and that the completion of the duplicate transmission line would practically do away with all chance of accident in the future.

**Electric Railway Terminal at Cleveland.**—A. E. Smith, of the Degnon Contracting Company, New York, N. Y., conferred in Cleveland on July 26, 1912, with Warren Bicknell relative to tentative plans for the proposed Cleveland interurban terminal. As has been stated previously in the Electric Railway Journal, the Terminal Realty Company has acquired on ninety-nine-year lease property between the Public Square and the Cuyahoga River. Mr. Bicknell stated that the plans are all tentative and that Mr. Smith's visit to Cleveland was merely to approximate the cost of a terminal and subway to accommodate all interurban roads from the east and southeast. Cars of the roads from the west must come in over surface lines, it is said, as they cannot reach the point of entrance to be used by the other roads. Because it is understood that W. H. Gratwick, Buffalo, N. Y., is interested in the improvement, the impression has been created that the terminal will be used by some of the steam railroads as well as the interurban railways.

**Rapid Transit Questions in Pittsburgh.**—The city planning commission of Pittsburgh, Pa., has taken up the question of rapid transit for the city by the appointment of a committee to be known as the rapid transit committee, with E. K. Morse, William McClurg Conley, Councilman P. J. McArdle, John R. McCune and County Commissioner J. Denny O'Neil as members. Mr. Morse is chairman of the committee. A. E. Anderson, president and counsel for the United Terminal System, under which name the Painters Run Railroad contemplates building a railway and terminal system to comply with the terms of an ordinance determined by the Council, will appear before the public service and surveys committee in support of the company's proposition. The agreement necessary to open Corliss Street, between West Carson Street and Chartiers Avenue, through a joint agreement of the Pittsburgh Railways, the Pan Handle Railroad and the Ohio Connecting Railroad, has been introduced in the Council, together with the franchise for the Pittsburgh Railways to occupy the new street.

**Qualifications for Trainmen for San Francisco's Municipal Railroad.**—The Civil Service Commission of San Francisco has announced that examinations will be held on Aug. 19, 20 and 22 to select applicants for motormen, conductors and inspectors for the Geary Street Municipal Railroad. Each class of employee will be rated differently under the topics of general knowledge of duties, knowledge of equipment and repairs, writing of report, arithmetic, physical ability and experience—general and special. A man who has had five years' experience in California within the last seven years as a motorman will be awarded the maximum credit of 100; periods of less than five years proportionately; experience of less than six months not rated. A conductor or inspector must have had general experience, the rating being on time from six months to five years in the State. For special experience they will be rated thus: Three years' experience had within the last five years in the service of the Geary Street, Park & Ocean Railroad, 100 credits; two years, 75; one year, 50; three years' experience had within the last five years in the service of any other street railway in the State, 50; two years, 40; one year, 20. Applicants must be twenty-one years of age or over and must have resided in San Francisco for at least one year preceding the date of application.

**Mr. Whitridge Would Pay His Taxes.**—Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., has appealed to Mayor Gaynor, whom he calls "protector of the poor," for aid in obtaining relief from the "gross, pig-headed injustice" to which he declares his company has been subjected by the state tax commissioners. In his letter Mr. Whitridge says in part: "The franchises of the Third Avenue System were assessed for 1901 at about $19,000,000. That assessment was contested for seven years and was finally reduced to about one-half by the Court of Appeals. After that and other decisions settling minor points were rendered I devoted a great deal of time getting the amount of the tax actually fixed, and through your good offices I finally succeeded in paying to the city and the State what it was agreed was the amount of the just tax. Since that time the board of tax commissioners has continued to assess the value of our franchise at about $19,000,000 each year, and each year I have been compelled to institute litigation to have that assessment reduced, and though I have paid to the comptroller $70,000 annually, the sum which my attorneys advise me is due, there is a large contingent liability dependent upon the result of these litigations. I want to pay my taxes not only for the last three years, but for all time, and if I can find out what they are I can assure you that they will be paid cheerfully and promptly."

**Progress of Subway Construction in New York.**—July 31 was the first anniversary of the beginning of work on the Lexington Avenue subway. From the report of Alfred Craven, chief engineer of the Public Service Commission, on the progress of work for the month ended July 15 it appears that contracts have been let by the commission for twelve of the sixteen sections of this line, aggregating 41,407 ft. in length, or about 8 miles, at contract prices totaling $35,521,291. A total of 3280 men are employed on the Lexington Avenue line. All of this is to be a four-track subway, and work is well advanced upon ten of the twelve sections under contract and is about to be started on the other two sections, the contracts for which were executed recently. As the total length of the Lexington Avenue line is a little less than 10 miles, the commission has contracted for four-fifths of the work. In addition to the Lexington Avenue line, work is also being vigorously prosecuted on the Fourth Avenue subway in Brooklyn and the last section of the Centre Street loop subway in Manhattan. The Fourth Avenue subway is a four-track road about 4 miles long, and the Centre Street loop subway is also a four-track road about 1½ miles long. The former is to cost about $15,000,000 and the latter about $11,000,000. Taking all three subways, namely, the Lexington Avenue line, the Fourth Avenue subway and the Centre Street loop, there is now under contract about $61,000,000 worth of work upon 13½ miles of four-track road. The only sections of the Lexington Avenue line which remain to be contracted for are Sections 1 and 1-A, extending from the Battery up Church and Vesey Streets to Broadway; Section 4, in Broadway north of Bleecker Street to a connection with the proposed Brooklyn Rapid Transit Company subway up Broadway, and Section 7, in Lexington Avenue between Fortieth and Fifty-third Streets. These were delayed by reason of changing the contracts, but the commission is pushing work on these changes and the revised contracts will soon be ready for bidding.

# Financial and Corporate

## Stock and Money Markets.

July 31, 1912.

The trading on the New York Stock Exchange was dull and heavy at the opening, but advanced briskly and continued strong and active to the close. Whereas the fluctuations yesterday were of practically no consequence, the advances to-day in prices were general and decided. The very favorable Brooklyn Rapid Transit Company report was not made public early enough in the day to be reflected in the market. Rates in the money market to-day were: Call, 2@3 per cent; sixty days, 3¾@4 per cent; ninety days, 4@4½ per cent.

The trading to-day on the Philadelphia Exchange ended dull and without any feature. Lehigh Valley Transit issues led in the activity in the traction stocks.

The traction issues were not in evidence to-day in the trading on the Chicago Exchange. Public Service, however, was the only prominent stock which showed a decline.

The Boston market was extremely dull to-day, with the tone generally easier. There was no important selling pressure, but there was such an absence of buying that it was extremely easy for traders to depress prices.

In Baltimore a feature was the sale of $26,000 of Washington, Baltimore & Annapolis 5's. This issue closed at 89⅝.

Quotations of traction and manufacturing securities as compared with last week follow:

| | July 24. | July 31. |
|---|---|---|
| American Brake Shoe & Foundry (common) | a96¼ | a96½ |
| American Brake Shoe & Foundry (preferred) | a141⅛ | a142¾ |
| American Cities Company (common) | a33 | *33 |
| American Cities Company (preferred) | a78½ | a78½ |
| American Light & Traction Company (common) | a385 | 408 |
| American Light & Traction Company (preferred) | a110 | 110 |
| American Railways Company | a43 | 43¾ |
| Aurora, Elgin & Chicago Railroad (common) | a47 | a47 |
| Aurora, Elgin & Chicago Railroad (preferred) | a90 | a90 |
| Boston Elevated Railway | a127 | 126 |
| Boston Suburban Electric Companies (common) | a15 | a15 |
| Boston Suburban Electric Companies (preferred) | a80 | a80 |
| Boston & Worcester Electric Companies (common) | a9⅝ | a9⅝ |
| Boston & Worcester Electric Companies (preferred) | 53 | 53 |
| Brooklyn Rapid Transit Company | 91⅞ | 92¾ |
| Capital Traction Company, Washington | a123¾ | 123¼ |
| Chicago City Railway | 190 | a190 |
| Chicago Elevated Railways (common) | a34 | a34 |
| Chicago Elevated Railways (preferred) | a92 | a92 |
| Chicago Railways, ptcptg., ctf. 1 | a97½ | a95¼ |
| Chicago Railways, ptcptg., ctf. 2 | a25⅛ | a25 |
| Chicago Railways, ptcptg., ctf. 3 | a8½ | a8½ |
| Chicago Railways, ptcptg., ctf. 4 | 4 | a4 |
| Cincinnati Street Railway | *130 | 128½ |
| Cleveland Railway | a105⅞ | a105⅞ |
| Cleveland, Southwestern & Columbus Ry. (common) | *4⅞ | *4⅞ |
| Cleveland, Southwestern & Columbus Ry. (preferred) | 33 | 33 |
| Columbus Railway & Light Company | 55 | a55 |
| Columbus Railway (common) | 80 | a80 |
| Columbus Railway (preferred) | 95 | a95 |
| Dayton Street Railway (common) | 25 | 25 |
| Dayton Street Railway (preferred) | 100 | 100 |
| Denver & Northwestern Railway | 140 | 140 |
| Detroit United Railway | 74⅜ | 70 |
| General Electric Company | 181 | 182 |
| Georgia Railway & Electric Company (common) | a126 | a126 |
| Georgia Railway & Electric Company (preferred) | a86 | a86 |
| Indiana Union Traction Company | *12 | *12 |
| Interborough Metropolitan Company (common) | 20⅛ | 20⅜ |
| Interborough Metropolitan Company (preferred) | 58½ | 58⅜ |
| International Traction Co., 4% bond rcts | *75 | *75 |
| Kansas City Railway & Light Company (common) | 18½ | a16 |
| Kansas City Railway & Light Company (preferred) | 40 | a45 |
| Lake Shore Electric Railway (common) | *6⅞ | *6⅞ |
| Lake Shore Electric Railway (1st preferred) | *85 | *85 |
| Lake Shore Electric Railway (2d preferred) | *22 | *22 |
| Manhattan Railway | 135¼ | 134 |
| Massachusetts Electric Companies (common) | a19½ | a20 |
| Massachusetts Electric Companies (preferred) | a78 | a76½ |
| Milwaukee Electric Railway & Light (preferred) | *105 | *105 |
| Norfolk Railway & Light Co. | 26 | 26 |
| North American Company | 82⅜ | 82½ |
| Northern Ohio Light & Traction Company (common) | 65 | 63 |
| Northern Ohio Light & Traction Company (preferred) | 105 | 100½ |
| Philadelphia Company, Pittsburgh (common) | a52 | *52 |
| Philadelphia Company, Pittsburgh (preferred) | a44¼ | 44½ |
| Philadelphia Rapid Transit Company | 26⅛ | 25⅞ |
| Portland Railway, Light & Power Company | 69 | *69 |
| Public Service Corporation | a112 | 114 |
| Third Avenue Railway, New York | 37 | 37¼ |
| Toledo Railways & Light Company | 7 | a7 |
| Twin City Rapid Transit Co., Minneapolis (common) | a108 | a108 |
| United Ry. & Electric Company (Baltimore) | a24½ | a24½ |
| United Rys. Inv. Co. (common) | a31 | 30¾ |
| United Rys. Inv. Co. (preferred) | a58 | a59¾ |
| Virginia Railway & Power Company (common) | 44½ | *44½ |
| Virginia Railway & Power Company (preferred) | 86¾ | 87½ |
| Washington Ry. & Electric Company (common) | a91¾ | 90 |
| Washington Ry. & Electric Company (preferred) | a94⅜ | 94 |
| West End Street Railway, Boston (common) | a85½ | a85½ |
| West End Street Railway, Boston (preferred) | a101 | a100½ |
| Westinghouse Elec. & Mfg. Co. | 77⅞ | 80 |
| Westinghouse Elec. & Mfg. Co. (1st preferred) | a114½ | 122 |

*Last sale. a Asked

## ANNUAL REPORTS

### Brooklyn Rapid Transit Company

The financial results of the Brooklyn (N. Y.) Rapid Transit Company for the year ended June 30, 1912, show an increase in gross earnings from operation of $1,240,007, or 5.64 per cent; an increase in operating expenses of $445,692.30, or 3.66 per cent; an increase in taxes of $309,506.63, or 21.12 per cent; an increase in surplus from operation of $651,278.06, or 21.28 per cent; an increase in reserve for insurance and depreciation of $386,846, and a decrease in bills payable of $950,000. The net surplus of the system for the year was $3,731,259, equivalent to 8.32 per cent upon the stock of the Brooklyn Rapid Transit Company, as against 6.82 per cent for the preceding year. The directors have set aside from the surplus account, as a special reserve fund, the sum of $1,000,000, making the total reserves, other than surplus, $2,016,045, and leaving the balance to the credit of surplus of the combined system as of June 30, 1912, $5,863,812.

Comparative summary of operations for the years ended June 30, 1912 and 1911, follows:

| Revenue from Operation. | 1912 | 1911 |
|---|---|---|
| Transportation | $22,949,021 | $21,716,486 |
| Miscellaneous | 277,529 | 270,057 |
| Total | $23,226,550 | $21,986,543 |
| Operating Expenses: | | |
| Maintenance of way and structure | $1,636,713 | $1,423,108 |
| Maintenance of equipment | 2,155,134 | 2,125,579 |
| Operation of power plant | 1,404,160 | 1,339,552 |
| Operation of cars—trainmen's wages | 3,863,699 | 3,714,683 |
| Operation of cars—other expenses | 1,586,974 | 1,584,180 |
| Damages | 681,440 | 750,854 |
| Legal expenses in connection with damages | 231,975 | 232,616 |
| General law expenses | 65,196 | 60,115 |
| Other general expenses | 733,294 | 707,369 |
| Freight and mail expenses | 252,763 | 227,004 |
| American Railway Traffic Co.—expenses | 711 | 1,306 |
| Total | $12,612,059 | $12,166,367 |
| Net revenue from operation | $10,614,491 | 9,820,175 |
| Income from other sources | 317,991 | 297,524 |
| Total income | $10,932,482 | $10,117,700 |
| Deductions: | | |
| Taxes | $1,775,042 | $1,465,535 |
| Interest and rentals (net) | 5,446,219 | 5,503,686 |
| Total | $7,221,260 | $6,969,221 |
| Net income | $3,711,222 | $3,148,478 |
| Special appropriations | ..... | 88,534 |
| Surplus from operations for the year | $3,711,222 | $3,059,944 |
| Profit from real estate disposed of and other miscellaneous items | 20,037 | ..... |
| Total surplus for year | $3,731,259 | $3,059,944 |
| Surplus at beginning of year | 5,427,394 | 4,781,035 |
| Total | $9,158,653 | $7,840,979 |
| Of this amount there has been appropriated: | | |
| Old accounts written off | $2,974 | $3,609 |
| Adjustment of taxes prior years | 28,544 | 49,856 |
| Adjustment of expenses prior years | 14,460 | ..... |
| Supersession and depreciation | 9,012 | 105,609 |
| Special reserve | 1,000,000 | ..... |
| Refunds applying prior years | ..... | 11,821 |
| Dividend on Brooklyn Rapid Transit Company stock outstanding | 2,239,850 | 2,242,690 |
| Total appropriations | $3,294,840 | $2,413,585 |
| Balance sheet surplus | $5,863,813 | $5,427,394 |

President T. S. Williams says in part:

"In the annual report of last year a statement was presented of the negotiations which had been proceeding between the company and the city authorities, represented by the Board of Estimate and Apportionment and the Public Service Commission for the First District, with a view to the construction and operation of new rapid transit lines. As these negotiations finally resulted, the city, through the Board of Estimate and Apportionment by its resolution of July 21, 1911, adopted a comprehensive plan of transportation and determined that the Brooklyn Rapid Transit Company, or a company organized in its interest, should be the operator thereof.

"The lines covered by the transit plan included all boroughs of the greater city, and the Public Service Commission was requested by the Board of Estimate to submit at the earliest practicable date the necessary forms of contracts. Before these contracts were prepared a new proposition was received by the Public Service Commission from the Interborough Rapid Transit Company expressing the

willingness of that company under stipulated conditions to contribute toward the construction of and to equip and operate certain of the rapid transit lines which previously it had been decided should be operated by the Brooklyn Rapid Transit Company, together with other lines. This new proposition was recommended by the Public Service Commission to the Board of Estimate and Apportionment, but before action thereon was taken by the latter board conferences were renewed with the Brooklyn Rapid Transit Company, with the result that the board, acting upon the supplementary report of its special committee, determined on May 22, 1912, upon a new program, involving substantially a return to the so-called 'dual system,' and a distribution of the new rapid transit lines between the two companies.

"Pursuant to the action of the Board of Estimate the Public Service Commission is now engaged in preparing formal contracts for both companies. In the meanwhile the validity of the proposed financial arrangements with the companies has been sustained by a decision of the Court of Appeals.

"The expense to the company for construction and equipment will be about $60,000,000. The existing rapid transit lines of the Brooklyn Union Elevated Railroad, the Canarsie Railroad and the Sea Beach Railway, together with the projected extensions thereof, will be operated in connection with the new city-owned rapid transit lines, and the track mileage of the unified system will be approximately as follows:

| | Mileage |
|---|---|
| Existing rapid transit lines | 105.522 |
| Additional tracks on above | 19.863 |
| Subways and tunnels | 70.580 |
| Elevated extensions (including bridges) | 73.034 |
| Total | 268.999 |

"A new company, whose stock will be owned by one of the companies of the Brooklyn Rapid Transit System, is being organized to make contract with the city.

"Inasmuch as it will be several years before the new lines are fully constructed and in full operation the Brooklyn Rapid Transit Company, in order to provide the new company with the necessary funds for construction and equipment, has contracted with the Central Trust Company, New York; Kuhn, Loeb & Company and Kidder, Peabody & Company for the sale of $40,000,000 six-year 5 per cent notes of an authorized issue of $60,000,000. These notes will be convertible at the option of the holder into the 5 per cent first mortgage bonds of the new company at any time prior to Jan. 1, 1916, on and after which date they are to be redeemable at the option of the company at 101 and accrued interest on any semi-annual interest day on ninety days' notice. The issue of notes will be secured—

"First—By the pledge with the Central Trust Company as trustee of an equal face amount of first mortgage 5 per cent bonds of the company which is to be organized to lease and equip the new subway and elevated lines allotted to the Brooklyn Rapid Transit interests;

"Second—By the pledge as additional security with said trust company, as trustee, of $10,000,000 of the convertible 4 per cent refunding bonds of the Brooklyn Rapid Transit Company, which bonds are now held in the treasury of the Brooklyn Rapid Transit Company. The proceeds of the notes are to be deposited as security for the notes until expended.

"Expenditures for many contemplated improvements have been deferred pending the consummation of rapid transit contracts with the city. The property of the system has been maintained at a high standard of efficiency, and among the additions and improvements are the following:

"On the surface lines, 12.62 miles of single track were rebuilt of standard construction, 66,640 yards of improved pavement were laid in city streets between track and rails, representing 7.89 miles of street; nine electrically operated switches, three additional crossovers and three new junction layouts were installed, forty-five pieces of special track work were renewed, terminal loops were constructed on property at Eighty-sixth Street and Fifth Avenue for the extension of short-line service on the Fifth Avenue line. The storage yard at Bergen Street depot has been enlarged by the construction of 860 feet of track, accommodating 20 additional cars.

'On the elevated lines 3.62 miles of track, and 0.43 mile of steel guard rails were renewed, 12.47 miles of guard timbers and 6.06 miles of footwalk were replaced, a new footwalk was laid across Brooklyn Bridge, 14,100 cross ties were renewed, facing point switches at important junction points were provided with additional locking devices to safeguard against derailments.

"The reinforcement of the elevated structure has been completed, approximately 86,200 ft. of structure having been reinforced. The repainting of the Fulton Street structure between Fulton Ferry and Flatbush Avenue, and the Third Avenue structure between Thirty-eighth Street and Sixty-fifth Street, is under way.

"One 20,000-kw turbo-generator with auxiliary equipment was contracted for, and will be in operation during the ensuing year. This installation will increase the capacity of the Williamsburg power station to 90,000 kw. One 5000-kw rotary converter was installed in the Prospect Park substation, increasing the capacity of that station to 5000 kw and the total capacity of the substations to 94,500 kw. Air chambers were constructed at the central and eastern power stations in the conduit system, and blowers were installed to clear the ducts and manholes from accumulation of gases, thereby reducing the possibility of damage by explosions. Switches were installed in ground wires at the various power and substations to lessen the chance of damage to feeder cables by electrolysis.

"One center-entrance car was constructed and has been in satisfactory experimental operation since June 15. One hundred cars of the same type will be ordered for delivery during the ensuing year. The company completely overhauled, repaired and revarnished 1,682 surface and 943 elevated cars.

"No bonds of any kind were sold during the fiscal year. Of the $50,199,000 par value of first refunding gold mortgage bonds authenticated and delivered to June 30, 1912, under the mortgage of July 1, 1902, $33,078,000 par value of bonds have been sold for cash, realizing $26,676,295.93, and $1,761,000 par value have been exchanged for bonds and stocks of constituent companioes. One bond was converted into stock. There were on hand June 30, 1912, refunding bonds of said issue of the par value of $17,121,000. These consist of:

| | |
|---|---|
| Collateral with banks and trust companies as security for Brooklyn Rapid Transit bills payable | $5,755,000 |
| In hands of treasurer Brooklyn Rapid Transit Company | 9,605,000 |
| In hands of treasurer of the Nassau Electric Railroad | 1,046,000 |
| Deposited with the trustee of Nassau consolidated mortgage | 700,000 |
| Deposited by the N. E. R. R. with city of New York and held in escrow | 15,000 |
| | $17,121,000 |

"The $482,000 of first refunding gold mortgage bonds authenticated and delivered during the fiscal year were issued to provide funds to purchase at their face value certificates of indebtedness of the constituent companies representing the actual amount of construction expenditures."

Traffic statistics for the last two years compare as follows:

| | 1912 | 1911 |
|---|---|---|
| Passenger earnings | $22,564,016 | $21,354,363 |
| Per cent of increase over preceding year | 5.66 | 4.28 |
| Passengers carried | 598,555,794 | 571,881,446 |
| Revenue mileage | 81,604,127 | 79,619,831 |
| Per cent of increase over preceding year | 2.49 | 2.10 |
| Earnings per revenue mile | 27.6 | 26.8 |
| UNITS PER PASSENGER—CENTS. | | |
| Passenger earnings | 3.77 | 3.73 |
| Miscellaneous earnings | 0.16 | 0.16 |
| Total earnings | 3.93 | 3.89 |
| Operating charges | 2.11 | 2.14 |
| Taxes | 0.29 | 0.26 |
| Interest and rentals | 0.91 | 0.96 |
| Total | 3.31 | 3.36 |
| Surplus | 0.62 | 0.53 |
| CHARGES PER CENT OF OPERATING EARNINGS. | | |
| Repairs and renewals | 16.39 | 16.21 |
| General operating | 33.89 | 34.59 |
| Damages | 2.95 | 3.43 |
| Legal expense | 1.28 | 1.34 |
| Total operating | 54.51 | 55.57 |
| Taxes | 7.67 | 6.69 |
| Interest and rentals (net) | 21.78 | 23.36 |
| Special appropriations | .... | 0.40 |
| Surplus | 16.04 | 13.98 |
| | 100.00 | 100.00 |

### York Railways

Earnings of the York (Pa.) Railways, the Edison Electric Light Company and the York Suburban Land Company for the year ended Nov. 30, 1911, compare as follows with the preceding year:

| | Year Ended Nov. 30, 1910. | 1911. |
|---|---|---|
| Gross earnings | $639,300 | $681,185 |
| Operating expenses, not including depreciation | 346,059 | 360,594 |
| | $293,240 | $320,591 |
| Miscellaneous income | 4,094 | 4,448 |
| Total income | $297,334 | $325,039 |
| Fixed charges and taxes | 227,660 | 244,074 |
| Net income before depreciation | $69,674 | 80,965 |
| Allowance before depreciation | 13,762 | 14,638 |
| Net income | 55,912 | 66,327 |
| Dividends | | 16,000 |
| Surplus | 55,912 | 50,327 |

Gordon Campbell, the president, says in part in his statement to stockholders:

"Owing to the many improvements to property during the year, a considerable saving in insurance has been effected. With an increased amount of insurance to cover additional property of $107,500, there has yet been a decrease of 25 per cent in the amount of the annual premium paid. This has been accomplished by the rewiring of electric light and power circuits in carhouses and power house, rewiring of cars, supplying fire doors, hydrants and other fire equipment and otherwise giving close attention to the requirements of the underwriters as well as bettering the properties.

"The Highland Park amusement properties were again operated under a lease, which results in better returns to the company as well as relieving operating officials of this detail to the advantage of transportation and traffic, matters demanding their full attention.

"The main improvement to your property during the past year has been the enlargement of the power plant to provide for the generation, by steam, of sufficient power for the full requirements for lighting and power and the operation of the railway system. This was made necessary by shortages and interruptions in the supply of power from the York Haven Company, under our contract. These deficiencies threatened to impair the business of your company.

"The provision of an ample power station is of the greatest potential value, and with improved service it is reasonable to expect a wholesome growth for the property during the next year.

"Meanwhile, in all details, the physical property has received careful attention with a general improvement in the condition."

### Review of Chicago Merger Negotiations

Requests for proxies for the annual meeting of the Chicago (Ill.) Railways which is to be held on Oct. 24, 1912, have been received by the participation certificate holders from A. C. Bartlett, Chauncey Keep and Henry A. Blair. It is asked that the proxies be mailed to F. L. Hup, secretary of the company. The character of the request for proxies is out of the ordinary in that in this particular instance it reviews the principal events in the conduct of the company. The request follows in part:

"Owing to the fact that sufficient time has not elapsed to realize the benefits of the immense expenditures in the way of rehabilitation and re-equipment as reflected in the amount of traffic, the management is confident that the future holds forth promise of better results than those heretofore obtained. The expense of operation during reconstruction is always greater than after such reconstruction has been completed. There has been a very large, extraordinary expense incurred in the litigations involved on account of claims that the Chicago Railways is liable for the debts of the former owners of the property. The future expense in the way of these litigations cannot be very great. Provision has been made for the payment of any judgments which may ultimately be obtained upon the small amount of bonds yet outstanding—$250,042 par value.

"These extraordinary expenses and the necessity of providing funds to meet any contingency have not permitted the declaration of dividends upon the capital stock of the company to an extent that would otherwise have been obtainable, but with most of the legal difficulties now behind the company, with immediate rehabilitation completed as to the property originally acquired by the company, with great progress having been made in the rehabilitation of the property of the Chicago Consolidated Traction Company, and with the increased traffic which the completion of the improvements upon the property last mentioned is sure to produce, the management looks with great confidence for better results in the future.

"It has long been the opinion of the management of the company that a merger, upon satisfactory terms, of its property with that of the Chicago City Railway and that of the elevated railways of Chicago would benefit all properties and greatly reduce operating expenses and cost of management, provided (1) that an ordinance authorizing such merger, fair and satisfactory in its terms, could be obtained from the City Council of the city of Chicago, and (2) that the city would consent to such a valuation of the property of the elevated railways as would justify them in joining in such a merger. Parties interested have exchanged figures and estimates as to earnings, cost of properties, etc., with a view to obtaining full information along these lines, but no plan or details of any plan of merger have been seriously discussed, much less determined. If a fair valuation can be obtained, the investigation of the subject has proceeded sufficiently, it is believed, to justify the assertion on the part of the management that a merger upon terms fair to all concerned can be reached. Of course, before any merger would be approved, everyone interested will be afforded an opportunity to be heard upon the subject."

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**Cassville & Western Railway, Cassville, Mo.**—Judge Van Valkenburg in the federal court at Springfield, Mo., has appointed G. M. Sebree receiver of the Cassville & Western Railway on the application of O. H. Orendorff, Eureka Springs, Ark., vice-president of the company.

**Columbus, Kenton & Toledo Traction Company, Columbus, Ohio.**—The Public Service Commission of Ohio has authorized the Columbus, Kenton & Toledo Traction Company to issue $1,385,000 of bonds to be sold at 80, and $50,000 of additional capital stock which is to be sold at par.

**Columbus Railway & Light Company, Columbus, Ohio.**—C. M. Clark and J. E. Clark, of E. W. Clark & Company, Philadelphia, Pa., accompanied by M. S. Hopkins, consulting engineer, arrived at Columbus on July 25, 1912. The executive officers of the Columbus Railway & Light Company and the subsidiary companies placed the data that have been secured during the past several months at the disposal of Messrs. Clark and Hopkins. It has been stated that the company will need about $800,000 in cash to meet its requirements. The second million dollars' worth of low-priced tickets has been sold. The time required was four days less than for the first million. The officials state that the increase in sales is not yet sufficient to offset the reduction in revenue from the low fare.

**Lake View Traction Company, Memphis, Tenn.**—Judge Francis Fentress of the Chancery Court at Memphis, Tenn., has ordered the sale of the property of the Lake View Traction Company on Sept. 2, 1912, under foreclosure. It is understood that the bondholders will buy in the property, and that they have arranged with the Mercantile Trust Company, St. Louis, Mo., for a sum sufficient to complete the line into Memphis. It is estimated that about $300,000 will be required for this purpose.

**Las Cruces (N. M.) Railway.**—The property of the Las Cruces Railway, consisting of a very short narrow gage railway and a franchise through Las Cruces and along the Paseo, will be sold under foreclosure on Aug. 17, 1912.

**Marion, Bluffton & Eastern Traction Company, Bluffton, Ind.**—The Union Savings & Trust Company, Bluffton, Ind., has been appointed receiver of the Marion, Bluffton & Eastern Traction Company.

**Manhattan Bridge Three-Cent Line.**—The Manhattan Bridge Three-Cent Line, organized to build an electric railways from Flatbush and Atlantic Avenues, Brooklyn, over the Manhattan Bridge and through the borough of

Manhattan to the Hudson River, has applied to the Public Service Commission of the First District of New York for permission to increase its capital stock from $50,000 to $1,000,000 and to issue $200,000 of the increased capital to provide funds with which to assemble the road, plant and equipment.

**Northern Electric Railway, San Francisco, Cal.**—The State Railroad Commission of California has authorized the Northern Electric Railway to issue $600,000 of thirty-year 5 per cent bonds, the proceeds to be used toward the construction of the Marysville and Colusa branch railway. The company applied for permission to issue $1,100,000 of bonds. The request for permission to issue the $500,000 of additional bonds will probably be renewed later.

**Sedalia Light & Traction Company, Sedalia, Mo.**—The City Light & Traction Company of Sedalia has been incorporated under the laws of Missouri with an authorized capital stock of $2,500,000, to succeed the Sedalia Light & Traction Company, the property of which was sold under foreclosure on June 7, 1912, and is now under the management of H. L. Doherty & Company, New York, N. Y., as noted in the Electric Railway Journal of June 15, 1912, page 1053.

**United Railroads, San Francisco, Cal.**—The United Railroads has applied to the Railroad Commission of California for permission to issue $300,000 in equipment trust certificates, the proceeds to be used to purchase sixty-five new cars.

**Valley Railways, Lemoyne, Pa.**—A charter has been granted to the Valley Railways Company in Pennsylvania as the successor to the Valley Traction Company, control of which is reported to have passed to State Senator Sproul, Chester, Pa., as noted in the Electric Railway Journal of July 13, 1912, page 69.

### Dividends Declared

Brockton & Plymouth Street Railway, Plymouth, Mass., 3 per cent, preferred.

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Connecticut Valley Street Railway, Greenfield, Mass., ½ of 1 per cent, common.

Detroit (Mich.) United Railway, quarterly, 1¼ per cent.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Ohio Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred.

Philadelphia Company, Pittsburgh, Pa., 2½ per cent, preferred; quarterly, 1¾ per cent, common.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1¼ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

### ELECTRIC RAILWAY MONTHLY EARNINGS

NORTHERN OHIO TRACTION & LIGHT COMPANY

| Period | Gross Earnings. | Operating Expenses. | Net Earnings. | Fixed Charges. | Net Income. |
|---|---|---|---|---|---|
| 1 m., June '12 | $276,961 | $154,489 | $122,472 | $43,817 | $78,655 |
| 1 " " '11 | 245,097 | 134,983 | 110,115 | 44,334 | 65,781 |
| 6 " " '12 | 1,377,336 | 792,830 | 584,505 | 262,925 | 321,580 |
| 6 " " '11 | 1,222,676 | 697,023 | 525,653 | 266,107 | 259,545 |

PUGET SOUND TRACTION, LIGHT & POWER COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., May, '12 | $681,003 | *$390.603 | $290,400 | $162,575 | $125,737 |
| 5 " " '12 | 3,423,921 | *1,982,410 | 1,441,511 | 804,368 | 637,143 |

SAVANNAH ELECTRIC COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., May, '12 | $63,524 | *$47,481 | $16,044 | $16,008 | $35 |
| 1 " " '11 | 56,777 | *41,277 | 15,501 | 15,377 | 124 |
| 12 " " '12 | 724,337 | *535,994 | 188,342 | 187,299 | 1,042 |
| 12 " " '11 | 655,729 | *472,222 | 183,508 | 182,328 | 1,180 |

TAMPA ELECTRIC COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., May, '12 | $63,365 | *$33,277 | $30,088 | $4,363 | $25,725 |
| 1 " " '11 | 55,302 | *32,267 | 23,034 | 5,396 | 17,639 |
| 12 " " '12 | 721,577 | *389,244 | 332,334 | 56,637 | 275,697 |
| 12 " " '11 | 608,448 | *343,906 | 264,542 | 55,496 | 209,046 |

*Includes taxes.

# Traffic and Transportation

### Welfare Work in Brooklyn.

The following interesting reference to the welfare work of the Brooklyn (N. Y.) Rapid Transit Company is made in the pamphlet report of the company for the year ended June 30, 1912:

"The Employees' Benefit Association of the Brooklyn Rapid Transit Company was organized in 1901, and for more than ten years has performed valuable service among the employees of this company, both in the operation of a plan of life and health insurance and in the general welfare field. Its membership on June 30, 1912, was 6905, and since its organization it has paid out $88,458 in death benefits, $205,917 in sick benefits and $54,506 in medical services. The objects of this association as originally proclaimed were sufficiently broad to include not only the insurance plan, but any activity which might tend to 'promote the social welfare of its members,' or 'to aid its members while they are disabled by reason of sickness or injury,' etc. So extended, however, did the work of the association become that for a series of years prior to 1912 it had been used not only for these purposes but as a sort of clearing house for welfare activities of the company itself.

"As a result, the association ran to increasing deficits, which deficits were paid by the Brooklyn Rapid Transit Company. A readjustment of the accounting between the Employees' Benefit Association and the Brooklyn Rapid Transit Company was, therefore, put into effect as of Jan. 1, 1912, under which the Brooklyn Rapid Transit Company assumed directly the support of such activities as belonged properly to the company's welfare department, leaving the insurance fund of the benefit association in a self-sustaining position, and creating, distinct from the insurance fund, a 'social work account,' for the purposes of such social activities as are carried on by the employees themselves.

"The same inquiry developed that much of the time of the president of the benefit association, George W. Edwards, was already given to matters of welfare work in which the company, rather than the benefit association, was the sustaining influence. It was believed that the services of Mr. Edwards could be utilized to best advantage if he became directly an employee of the company, and therefore the office of welfare administrator was created, to which he was appointed.

"In connection with these changes, attention has been given to certain details contributing to the welfare of our employees. Plans have been made for taking over and operating directly the system of lunch rooms in the several depots of the company which has been operated during the last five years by the Inter-City Car Advertising Company, under a contract which expires in October, 1912. As a beginning of this restaurant system, one lunch room has been installed in the Flatbush depot, equipped with model apparatus, and operated on the principle of giving the best of food at the lowest practicable cost. The operation of this room indicates that the establishment of the general system of lunch rooms by the company will be of substantial aid to our employees.

"In several of the depots of the system plans have been considered for reconstructing the club rooms provided for employees. At the Fifty-eighth Street depot the work of reconstruction is now under way, and the second of the new lunch rooms will be opened there within a few weeks. Plans have been prepared and bids received for the construction of new club rooms and a lunch room at the Ridgewood depot, but this work has been temporarily postponed, owing to the fact that the construction of the new rapid transit line, from the Fourteenth Street tunnel to East New York, will involve a general readjustment of conditions at the Ridgewood terminal.

"Several other lines of inquiry connected more or less directly with the question of welfare are now being prosecuted. In co-operation with the division of remedial loans of the Russell Sage Foundation, a study is being made of the question of a savings and loan association for our employees. Other studies are being made into the question of broadening somewhat the opportunities given to the employees to obtain insurance at moderate cost.

"Before the close of the fiscal year the directors authorized an increase in wages affecting about 5,000 employees. This increase went into effect in July, 1912."

### Court Decision in Interesting Fare Case

Justice Sutherland, of the Supreme Court of New York, sitting in Rochester, has handed down a decision which upholds the contention of the management of the Rochester, Syracuse & Eastern Railroad that where the cash fare between two specified points is greater than the sum of the local fares between those two points the passenger has no right to pay his fare from stop to stop and thus obtain a lower fare than if he paid the through rate. The decision was the result of a suit brought against the company by William J. Hayes to recover a penalty for the alleged exaction of an unlawful fare. Justice Sutherland held that Hayes was not entitled to any penalty.

On Dec. 10, 1911, Mr. Hayes boarded a local car of the Rochester, Syracuse & Eastern Railroad at Palmyra, intending to go to Port Gibson. The ticket fare was 10 cents and the cash fare was 15 cents. The cash fare from Palmyra to Stop 37 was 5 cents and from Stop 37 to Port Gibson was also 5 cents, making the sum of the local cash fares 5 cents less than the through cash fares. Mr. Hayes claimed he did not have time to purchase a ticket and the conductor, after learning his destination, requested him to pay 15 cents. Mr. Hayes then told the conductor he was going to Stop 37, whereupon he paid the 5-cent fare. When Stop 37 was reached he did not leave the car, but tendered the conductor 5 cents more to cover his fare from Stop 37 to Port Gibson. The conductor refused to accept less than 10 cents, declaring Mr. Hayes to be a "through" passenger and therefore entitled to pay the "through" rate. Mr. Hayes finally handed the conductor a five-dollar bill. The conductor lacked cash sufficient to change the bill so he kept the bill and notified Mr. Hayes that he would leave the change at the Port Gibson ticket office. The conductor deducted the 10 cents remaining to be paid and deposited the change, amounting to $4.90, with the Port Gibson agent later in the day. Mr. Hayes refused to call for his change and shortly thereafter he was formally notified from the general offices that his change awaited him at the Port Gibson station. In his suit against the company, Mr. Hayes demanded $4.95 change and $50 penalty. Justice Sutherland held that Mr. Hayes was entitled to $4.90 change and no more.

### Committee on Safety and Efficiency Established by the Chicago, South Bend & Northern Indiana Railway

The Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has issued a bulletin as follows to its employees in regard to the establishment by the company of a committee on safety and efficiency:

"Following the lead of many of the electric and steam railroads of this country, we have decided to install a committee on safety and efficiency, whose personnel until Jan. 1, 1913, unless otherwise ordered, shall be as follows: C. D. Emmons, ex officio, chairman; F. I. Hardy, vice-chairman; F. C. Jellison, secretary; L. E. Hollar, representing the interurban division; S. Witucki, representing the Goshen-St. Joe interurban division; F. D. Kaley, representing the South Bend-Michigan City division; Clyde Painter, representing the South Bend City division; J. F. Lambka, representing the Michigan City division; A. T. Morningstar, representing the Elkhart City division.

"The duties of the members of this safety and efficiency committee shall be to keep a continual lookout for anything that might cause or tend to cause accidents or anything wherein the efficiency of our service to the public can be increased.

"It is our desire that all employees should become actively interested in this movement, and report promptly in writing to the member of their division any defect noted or suggestion they wish to make. Remember it may be your turn next to serve as a member of this committee.

"Committee members having observed or having been advised of existing defects must during the same day report same to the chairman of the committee on blanks provided for that purpose and where defects are liable to cause accident must at once report the same to the division superintendent, who will be expected to see that same is immediately repaired.

"It is proposed that this committee meet in monthly sessions at 3 p.m. on the second Monday of each month, at which time suggestions for improved safety or more efficient service as suggested to committee members by any employee, or as a suggestion by committee members themselves, will be thoroughly discussed. All employees are solicited to put their suggestions in writing, as we will be glad to be afforded the benefit of the ideas and observations of the employee in any department.

"Defective track and special work, defective cars, defective poles or overhead work, defective platforms and landings, defective buildings, bridges or trestles, obstructions near track, careless or indifferent operation of cars, flagging of crossings, and all other matters that might cause an accident should be promptly reported.

"It will also be the duty of the members of this committee to watch the work of other employees—especially new men just entering the service of the company. If negligence in operation is observed due to excessive speed, running without hands on controller or brakes, failure to ring gong or to slow down at dangerous points or in passing other cars, failure to make a complete stop and to have proper flagging over steam railroad crossings, the committee man is authorized to go to the other employee in a friendly way and advise him about anything in his operation which is likely to cause accidents. If the man spoken to in this friendly way does not respond to the advice given him, it will be necessary for the member on safety and efficiency to report the matter to the proper authority, whereupon the offending employee will be disciplined. Our employees cannot afford to have a habitually careless man among them.

"By making appointments to this committee every six months it is thought to give an opportunity to a large number of our employees to serve their company in this way—giving them additional advantages to become acquainted with this very important public business."

A copy of the bulletin has been submitted to the Railroad Commission of Indiana for its information.

**Illinois Road Ordered to Suspend Traffic.**—The Illinois Railroad & Warehouse Commission has ordered the Springfield, Clear Lake & Rochester Interurban Railway to suspend traffic until bridges over certain streams have been made safe.

**Fare Zone Cards.**—The Public Service Railway, Newark, N. J., will install cards for the guidance of passengers in all cars running over a district where there is more than one fare zone. These cards will show the points between which fares are collected. Samples of the cards which have been prepared have been filed with the Public Utilities Commission.

**Accidents in New York City.**—Reports of accidents on the railroads and street railroads of New York City for June, 1912, show that only fifteen persons were killed as against twenty-eight in June, 1911. The number of serious injuries was only 206 in June, 1911, as against 276 in June, 1912. The total number of accidents of all kinds was 6342 in June, 1912, against 5997 in June, 1911.

**Service Order of Maryland Commission.**—The Public Service Commission of Maryland has handed down an opinion compelling the United Railways & Electric Company to carry all passengers on the Harford road line to the Harford road terminus for 5 cents. By order of the commission, when a car does not go to the end of the line a transfer must be issued, good on a through car.

**St. Louis Center-Entrance Car Modified.**—The experimental center-entrance car placed in service recently by the United Railways, St. Louis, Mo., on its Delmar-Olive division has been withdrawn and cross seats have been substituted for the longitudinal seats with which the car was originally fitted. The car was designed for use as a trailer and has a seating capacity of sixty-eight persons.

**Gates on All Cars in Louisville.**—So successful has the Louisville (Ky.) Railway been in reducing the number of accidents through the use of safety gates on the rear platforms that the company will install gates on all of its cars. The gates are controlled by the conductor and are kept

closed until cars come to a stop, thus eliminating accidents caused while passengers are getting on or off moving cars.

**Service Resumed in London, Ohio.**—The Ohio Electric Railway, Cincinnati, Ohio, has restored the service to the village of London which was abandoned when a demand was made that the company pave the streets over which it operates. The matter was taken to the Public Service Commission, but the complaint was dismissed after an agreement had been reached between the village and the company.

**As Others See Us.**—G. A. Richardson, superintendent of transportation of the Puget Sound Traction, Light & Power Company, Seattle division, who made a trip of inspection to several Eastern cities during March and April, has written two very interesting articles summarizing his observations, the first one of which is published in the July issue of the *Electric Journal*, which is distributed among the employees of the Puget Sound Traction, Light & Power Company.

**Accident Prevention Crusade in Rockford.**—The Rockford & Interurban Railway is conducting an accident prevention crusade on the city lines of Rockford, Ill. As a feature of the crusade blotters are being distributed to all the homes in Rockford, on which there is a halftone engraving showing a car approaching a street corner and the result to a woman attempting to alight while the car is in motion. The blotters also contain the following, in large letters: "Help us to avoid accidents. Wait for the car to stop before getting off."

**Chicago Near-Side Stop Ordinance.**—All cars within the corporate limits of Chicago stop only on the near side of streets in compliance with an ordinance passed by the City Council on July 15, 1912. The ordinance as prepared by the local transportation committee provided for near-side stops within a given zone which included the "Loop" district. In order to avoid confusion in the outlying districts it was decided to make the ordinance applicable throughout the city. Heretofore at boulevards and street railway crossings two stops have been made. The ordinance went into effect on July 30, 1912.

**Conference in Regard to Extension of Fare Limits.**—The railroad commissioners of Massachusetts conferred recently with Francis H. Dewey, president of the Worcester (Mass.) Consolidated Street Railway, and with the representatives of Southbridge, Sturbridge and Leicester, who want an extension of the limit for which people are carried for a 5-cent fare by the company. Chairman MacLeod of the commission said that such a situation would always exist wherever there is a fare limit, that there must always be people who live just beyond it, and that in every instance they could make out a case of benefit to them. The hearing was long protracted, but was closed after Mr. Dewey presented his documentary evidence.

**Through Limited Service Between Rockford and Chicago.**—The Rockford & Interurban Railway, Rockford, Ill., has issued a time card announcing its through limited service between Rockford and Chicago. This service has been in effect since June 3, 1912, and includes two trains each way daily with one change at Elgin, where the Rockford trains connect with those of the Aurora, Elgin & Chicago Railroad. The folder announces that the trip is made in three hours and that the morning limited is especially attractive to shoppers and business men and the afternoon trains to traveling men and theater parties. The company also states that the round-trip fare between Rockford and Chicago by electric railway is $1 less than by steam railroad.

**New Accident Crusade Poster in Chicago.**—The Chicago (Ill.) City Railway has issued the third poster in connection with its general safety to passengers and public safety crusade. The first two posters, which have been described in the ELECTRIC RAILWAY JOURNAL, directed attention, respectively to the proper way to alight from a car and to the danger of passing behind a car without first stopping and looking for the approaching car on the other track. The urgent need of a poster calling attention to the danger to children who play in a street where there is a street railway has impressed itself on the claim department, and on R. S. Rowley, claim agent of the company, in particular. The vacation period in the public schools has tended to increase greatly the number of accidents. Thirty children between the ages of two years and twelve years have been killed by automobiles, trucks and street cars in the past month. The claim department of the company is doing everything in its power to reduce its accident record.

**Service in Ithaca.**—The Public Service Commission of the Second District of New York had before it recently the matter of the abandonment of service upon the Cayuga Heights line of the Ithaca Street Railway in Ithaca. The proceeding was on an order to show cause why the receivers of that corporation should not re-establish service which had been abandoned. The attorneys for the receivers raised the question of the jurisdiction of the commission over the receivers and as to its power to make an order which would be binding upon them. It was shown that the line in question was the property of a separate corporation known as the Ithaca & Cayuga Heights Railway, which was leased to the Ithaca Street Railway. The receivers found after six months' operation of the leased line that the expenses of labor on the line were four times the receipts, and discontinued the service, which if continued would require the use of the earnings of the Ithaca Street Railway to make up a deficit of the leased line. Judge Charles H. Blood and Jared T. Newman, who appeared for residents of Ithaca, argued that in all ways the Cayuga Heights line was an inherent part of the Ithaca Street Railway. At the request of both parties the case was adjourned until July 29, 1912.

**Illinois Traction Interchange Contract with M., K. & T. at St. Louis.**—The Illinois Traction System has closed an interchange contract with the Missouri, Kansas & Texas Railway which calls for an open and unrestricted interchange of passenger business involving interline tickets and through rates between all points on the Illinois Traction System and the Missouri, Kansas & Texas Railway. This is the first steam railroad to consent to a general interchange of passenger traffic with the Illinois Traction System, it being accorded all the privileges of the steam railroads. An interchange contract has also been made with the Minneapolis & St. Louis Railway at Peoria. This steam railroad operates northwest of Peoria as far as St. Paul, Minn., and as far west as the Dakotas. The interchange contract includes less than carload traffic out of Peoria and through rates and divisions to and from all stations on both lines. As there is no existing physical connection between the Illinois Traction System and the Minneapolis & St. Louis Railway, it was impossible at this time to include carload traffic in the interchange relations. A physical connection, however, will be made in the near future. George Quackenbush, general traffic manager of the Illinois Traction System, has been negotiating with the steam railroads for some time and is responsible for the successful consummation of the agreement.

**Chicago Surface Railway Employees Demand Wage Increase.**—The working agreement between the employees of the Chicago (Ill.) Railways and the Chicago City Railway and the companies expires on Aug. 1, 1910. Increases in wages which will total approximately $1,000,000 a year have been asked for in the new contract. The wage schedule which the companies have been asked to put into effect follows: First six months, 26 cents per hour; next six months, 28 cents per hour; second year, 30 cents per hour; after two years, 34 cents per hour. The present scale paid the trainmen is 23 cents for the first six months, 25 cents for the second six months and an increase of 1 cent an hour thereafter until a maximum of 30 cents has been reached at the end of five years. The formal demand is in the hands of the managements of the two surface railways. It includes, in addition to the wage increase, a reduction in the maximum number of working hours from eleven to ten and a revision of the swings so as to allow the crews to finish the day in fourteen hours instead of eighteen hours. A joint conference was held between the representatives of the employees and the managers, but no definite understanding was reached. Both companies have expressed their willingness to renew the existing contract for a term of years, but have refused to meet the demands presented by the employees. It seems likely that the employees will reject this offer and that the whole subject will be submitted to a board of arbitration for adjustment.

# Personal Mention

**Mr. J. M. Stoddard** has been appointed superintendent of the Long Island Electric Railway and the New York & Long Island Traction Company, Long Island City, N. Y., to succeed Mr. I. B. Clarke, resigned.

**Mr. B. E. Parker,** formerly superintendent of transportation of the Rockford & Interurban Railway, Rockford, Ill., has been appointed general superintendent of the Evansville Public Service Company, Evansville, Ind.

**Mr. Joseph Gehringer** has been appointed engineer of track and roadway of the Evansville Public Service Company, Evansville, Ind. Mr. Gehringer was formerly division engineer of the Indiana Union Traction Company.

**Mr. T. C. Roberts** has resigned as general superintendent and chief engineer of the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., to accept the position of chief engineer of the United Verde Copper Company, Jerome, Ariz.

**Mr. B. M. Smith** has been appointed superintendent of the Hattiesburg (Miss.) Traction Company. Mr. Smith was formerly connected with the Meridian Light & Railway Company, Meridian, Miss. Both properties are controlled by H. L. Doherty & Company.

**Mr. Harry R. Warfield,** president of the Union Utilities Company, Morgantown, W. Va., has been elected president of the West Virginia Traction & Electric Company, incorporated to take over the property of the City & Elm Grove Railway, Wheeling, W. Va., and the Union Utilities Company, Morgantown, W. Va.

**Mr. D. W. Campbell,** assistant general manager of the second district of the Oregon-Washington Railroad & Navigation Company, Portland, Ore., has been elected president of the Salem, Falls City & Western Railway, which has been acquired by the Southern Pacific Company and will be equipped with electricity.

**Mr. H. B. Ross,** who has been claim agent of the Waco (Tex.) Street Railway, has been appointed acting superintendent of the company, to succeed Mr. A. D. Brinkerhoff, who, as previously noted in the Electric Railway Journal, has been appointed resident manager of the St. François County Railroad, Farmington, Mo.

**Mr. Robert E. Strahorn,** vice-president of the Oregon-Washington Railroad & Navigation Company, has been elected president of the Portland, Eugene & Eastern Railway, Portland, Ore., acquired by the Southern Pacific Company in connection with the electric railway development which the latter will carry out in the Willamette Valley.

**Mr. A. C. Huebner** has resigned as general storekeeper of the Philadelphia (Pa.) Rapid Transit Company to accept a position with the Diamond Rubber Company, New York, N. Y., in the insulated wire department. Mr. Huebner entered the employ of the Philadelphia Rapid Transit Company in 1901, as a clerk in the purchasing department, and later filled the position of assistant purchasing agent as well as secretary to the second vice-president and general manager. He was subsequently appointed general storekeeper.

**Mr. William E. Havens,** operating superintendent of the Oswego city lines of the Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y., has been appointed acting general manager of the Buffalo, Lockport & Rochester Railway. Prior to his appointment at Oswego three years ago Mr. Havens was operating superintendent of the Auburn & Syracuse Electric Railroad. Mr. Havens will assume his new duties at once, making his headquarters at Rochester. His successor at Oswego has not yet been selected. On Jan. 1, 1912, Mr. J. M. Campbell, who was general manager of the Buffalo, Lockport & Rochester Railway before it was acquired by the Beebe interests and who continued for some time in that capacity under the new management, resigned the position. Since that time the executive duties have been looked after by Mr. C. D. Beebe, the president of the company.

**Mr. Edward C. Spring,** formerly assistant to the president of the Philadelphia & Western Railway, Upper Darby, Pa., in charge of operation, has been appointed manager of the Philadelphia division of the Lehigh Valley Transit Company, Allentown, Pa., in charge of all lines south of Allentown. In his new position, in which he will be division manager and assistant to the president, Mr. Spring will operate not only the Philadelphia & Western Railroad, but the lines from Allentown to Chestnut Hill and that from Lansdale to Norristown. As soon as the Lehigh Valley Transit Company's construction work between Lansdale and Norristown is completed, the fast new express service will be inaugurated between Allentown and Philadelphia, and the line between Lansdale and Chestnut Hill, now part of the main line of the Philadelphia division, will be operated as a local. Mr. Spring's headquarters will be in Lansdale, where the company has bought property for a waiting station and offices.

**Mr. L. S. Boggs** has resigned as superintendent of electrical construction with the New York, New Haven & Hartford Railroad to become general manager of the Macon Railway & Light Company, Macon, Ga. Mr. Boggs was graduated from Purdue University in 1888. He became connected with the Sprague Electric Railway & Motor Company in Chicago and remained with that company from 1888 to 1890. During the school year 1890-1891 he took a post-graduate course in electrical engineering at Purdue University and from 1891 to 1894 he was engineer of power at the World's Columbian Exposition at Chicago. In 1895 Mr. Boggs was electrical engineer for the Cotton State and International Exposition at Atlanta, Ga., and from 1896 to 1900 he was electrical engineer for the Pioneer Electric Power Company, Ogden, Utah, which was absorbed by the Utah Light & Railway Company. The installation of the Pioneer Electric Company was the first 30,000-volt line put into commercial operation. The line was 37 miles long. From 1901 to 1904 he was with Sargent & Lundy, consulting engineers, Chicago. From 1904 to 1909 Mr. Boggs was with the Westinghouse Electric & Manufacturing Company on single-phase railroad construction and directed the construction work for that company on the electrification of the New York, New Haven & Hartford Railroad main line between Woodlawn and Stamford. From 1909 to 1910 he was chief inspector for the Pennsylvania Tunnel & Terminal Railroad on the extension of the Pennsylvania Railroad system into New York. Subsequently he returned to the service of the New York, New Haven & Hartford Railroad as superintendent of electrical construction on the Harlem River branch.

## Fare Order in New York State

The Public Service Commission of the Second District of New York has ordered the Syracuse, Lake Shore & Northern Railroad to offer for sale on or before Aug. 10, 1912, its 20-cent round-trip tickets between the Syracuse terminal and Long Branch, good for use during a period of thirty days from the date of sale, instead of a one-day limit, as now applied to these low-rate tickets, which are on sale during the season from May 1 to Sept. 30 each year. The company has also been ordered to put in effect on or before Aug. 10 a single-trip cash fare of 10 cents between Stop 1 (within Syracuse) and Long Branch, instead of its present one-way cash fare of 15 cents.

The action of the commission is the result of formal complaint to it by residents of Syracuse against the increased rates of fare to and from Long Branch or Stop 11 put in effect by the company on Oct. 6, 1911. The opinion in the matter was prepared by Commissioner Martin S. Decker, and in addition to providing for the reduced rates referred to holds that no reason is apparent for disturbing the round-trip fare of 25 cents which is in effect between Syracuse and Long Branch during other than the summer season or from Oct. 1 to April 30. An analysis of the fares at present and previously in force is made, and the opinion makes the following statement:

"The fact that respondent has in effect during the summer season a 20-cent round-trip fare implies that it should be offered on terms under which it can be freely used. Temporary residents at Long Branch in summer may not be able to use the commutation ticket freely, that is, they may not desire to ride nearly as many as fifty times during the month."

# Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

## RECENT INCORPORATIONS

**Gary, Merrillville & Southern Interurban Company, Indianapolis, Ind.**—Application for a charter has been made by this company to build an electric railway to connect Indianapolis, Lowell, Cedar Lake, Merrillville, Gary, Crown Point and Lafayette. Capital stock, $100,000. M. N. Castleman, Gary, president; Joseph Shilto, Merrillville, vice-president; Martin G. Gill, Gary, secretary, and Ernest Walters, Merrillville, treasurer. [E. R. J., July 27, 1912.]

***Michigan City, Lakeside & St. Joe Electric Railway, Michigan City, Ind.**—Incorporated in Michigan to build an electric railway from St. Joe, Mich., to Michigan City, Ind., via Berrien County. Capital stock, $750,000.

***Detroit & Highland Park Railroad, Detroit, Mich.**—Incorporated with a capital stock of $50,000 and will construct a 2½-mile electric railway from Greenfield Township to Hamilton Boulevard, just outside the city of Detroit. The primary purpose of the line is to open up a new subdivision.

***Superior (Minn.) Interurban Traction Company.**—Incorporated under the laws of Wisconsin to construct an electric railway from South Superior to the steel plant. The line will be about 5 miles long. Among those interested are: H. E. Voight, T. W. Wahl and M. Boidoir, of Duluth; T. H. Fairfax and J. J. Hurst, of Superior.

***St. Louis & Western Traction Company, St. Louis, Mo.**—Incorporated with a capital stock of $300,000, to build an electric railway through St. Louis County from the southwest corner of Forest Park, almost directly west through the county to a point on the Missouri River opposite Weldon Springs, in St. Charles County, a distance of 25 miles. J. D. Houseman, the principal promoter and stockholder of the proposed corporation, has acquired all the right-of-way, property and legal rights of the St. Louis, Webster & Valley Park Railroad. Incorporators: J. D. Houseman, Powell Johnson, Richard K. Papin, John Brennan, Jr., Matthew T Chestnut, William R. Harrison and Charles F. Redman.

**City Light & Traction Company, Sedalia, Mo.**—Incorporated under the laws of Missouri with an authorized capital stock of $2,500,000 to succeed the Sedalia Light & Traction Company, the property of which was sold under foreclosure on June 17, 1912. See department Financial and Corporate elsewhere in this issue.

***Stanton & Cave Bluff Railway, Stanton, Mo.**—Chartered in Missouri to build a 4¾-mile electric or steam railway from Saltpeter Cave to Stanton. Capital stock, $100,000. Incorporators: William B. Baumann, L. J. Matlock, John F. Borland and George P. Burleigh, St. Louis; C. A. Ruepele, D. Hammer and James Schmucke, Stanton, Mo.

**Valley Railways, Lemoyne, Pa.**—Chartered in Pennsylvania to take over the Valley Traction Company, which operates from Harrisburg to Carlisle, New Cumberland and Marysville. Capital stock, $10,000. State Senator William C. Sproul, of Chester, will likely be the president of the new company. Other incorporators are: William I. Schaeffer, Felton Bent, E. P. Passmore, John J. Stetsor and John B. Hannum, Jr.

***Pittston & Exeter Railway, Pittston, Pa.**—Chartered to build a 1-mile electric railway in Pittston. Capital stock, $6000. William Drury is president.

***Rio Grande Valley Traction Company, El Paso, Tex.**—Chartered in Texas with a capital stock of $300,000 to construct a 16-mile electric railway between El Paso and Socorro. The headquarters will be at El Paso. The directors will be Marshall M. Phinney and Theodore T. Whitney, Jr., Boston, Mass., and Edwin B. Parker, C. R. Wharton, J. H. Tallichet, Raymond Neilson and David Daly, Houston.

## FRANCHISES

**Huntsville, Ala.**—The City Commissioners have granted a new franchise to the Huntsville Railway, Light & Power Company to extend for a period of thirty years. The new franchise was granted on request of the Alabama Power & Development Company, which is negotiating for the purchase of the Huntsville Railway, Light & Power Company.

**Santa Barbara, Cal.**—The Central California Traction Company has received a forty-six-year franchise for a single track from its Park Street line north on Union Street to connect with the tracks of the Western Pacific Railroad.

**New Castle, Del.**—The Council has granted a franchise to the Wilmington, New Castle & Delaware City Railroad to operate through New Castle.

**Forsyth, Ga.**—The Council has granted a franchise to the Atlanta & Macon Railway to operate through Forsyth. [E. R. J., July 6, '12.]

**Alton, Ill.**—The Alton, Jacksonville & Peoria Railway, Alton, has received a franchise from the Council to extend some of its lines in Alton.

**Harrisburg, Ill.**—The Council has granted the Southern Illinois Railway a franchise. This completes the right-of-way and Harrisburg franchise for the line from Carrier Mills to Eldorado.

**Springfield, Ill.**—The Springfield Northwestern Interburban Railway will ask the Council for a franchise to build on North Eighth Street from Carpenter Street to the city limits.

**Athol, Mass.**—The Athol & Orange Street Railway has received a franchise for a spur track on School Street.

**Columbia, Mo.**—The Columbia Interurban Electric Railway has received a franchise from the Boone County Court over county roads between Columbia and Prathersville. This line will connect the coal fields of northern Boone County with Columbia.

**Old Madison, Pa.**—The Council has granted a franchise to the Herminie Street Railway. The proposed line will connect New Madison, Old Madison, Herminie, Arona, Weyl, Yukon and Wyano. Later it is said the line will be extended to Greensburg and on the other end to West Newton.

**Beaumont, Tex.**—The City Council has passed the ordinance granting to the Beaumont Light & Power Company an extension of twenty-five years on its lighting franchise in Beaumont. The ordinance contains a provision requiring Stone & Webster to commence work on the interurban line between Beaumont and Port Arthur within nine months and to have the line in operation by Dec. 31, 1914.

## TRACK AND ROADWAY

**Pacific Electric Railway, Los Angeles, Cal.**—Four-track lines to Redondo by way of Watts, Homeward, Hawthorne, Ingledale and Lawndale are to be installed in a short time by the Pacific Electric Railway. Engineers representing the Pacific Electric Railway, the Los Angeles Railway and the Standard Oil Company, which is to have a branch line from Ingledale Acres to El Segundo, have made the final survey. Redondo traffic will be diverted from the San Pedro line at Watts to the new line, which already has two tracks as far as Homeward. From there the new line will be extended west to Hawthorne and Ingledale Acres, where connection is made with the present double-track line to Redondo by way of Belvidere. From Ingledale Acres a branch line will be built westward to El Segundo.

***San Bernardino, Cal.**—Nearly 3 miles of the trackless trolley to be operated from the Santa Fe line near Cajon to the limestone quarries and the head of Swarthout Canyon have been graded, according to S. B. Wright, a director of the Lone Pine Utilities Company, the owner of the project. The total length of the line will be about 12 miles.

**Arkansas Valley Railway, Light & Power Company, Pueblo, Col.**—It is stated that this company will expend $60,000 in improving its lines in the northern part of Pueblo within the next three months. New 6-in., 75-lb. rails will be laid to replace the 4-in., 65-lb. rails now in use.

**New Haven, Conn.**—The public utilities commission has made public findings granting petitions of the Connecticut

Company for the approval of its proposed method of construction of a second track from Double Beach to Brockett's Point, Branford; of track work on Shelton Avenue, New Haven, and of double tracking near White Oak, New Britain.

**New London & East Lyme Street Railway, New London, Conn.**—This company has completed its extension to Crescent Beach.

***Waycross, Ga.**—A movement has been started in Hilliard, Fla., for an electric railway from Waycross through Folkston, Hilliard, Callahan and into Jacksonville. A committee of citizens of Hilliard has been named to confer with parties along the proposed route.

**Evansville, (Ind.) Railways.**—This company, which has recently completed a line between Evansville and Henderson, Ky., is planning to construct an interurban line between Henderson and Owensboro, Ky. The Tennis company, which is interested in the Evansville Railways, is relied upon to finance the extension. It is said by representatives of the Tennis company that it is not likely that the construction of the extension will be undertaken immediately, although it is a project to which it intends to give attention later on.

**Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.**—This railway has begun the extension of the Driving Park line to Forest Park Boulevard in Fort Wayne.

**Cincinnati, Louisville, Lexington & Maysville Traction Company, Dry Ridge, Ky.**—This company is completing its line from Dry Ridge, Ky., to Owenton, Ky., and the tracks are being put in shape for traffic. The company is now building from Independence, near Covington, Ky., to Dry Ridge, and upon the completion of this section the entrance to Covington from Independence will be effected. The survey of the latter section has been completed.

**Kentucky Traction & Terminal Company, Lexington, Ky.**—The Shelbyville & Frankfort Realty Company, which is endeavoring to secure the construction of an electric railway between those cities, is negotiating with the Kentucky Traction & Terminal Company regarding the line. The latter operates between Lexington and Frankfort, and will consider building the extension, it is reported.

***Stearns, Ky.**—Plans have been proposed for the construction of an electric railway from Stearns, Ky., to Whitley City, Ky. It is proposed to secure power from the plant of the Stearns Coal Company, which operates a large coal property at Stearns.

***Lake Arthur & Jennings Railway, Jennings, La.**—It is stated that this company has decided to operate its proposed interurban railway between Elton, Lake Arthur and Jennings with electricity instead of steam. Grading has been completed. A power plant will be erected at Jennings. W. B. Conover, president, and B. B. Bliss, secretary.

**Shreveport (La.) Traction Company.**—This company is reported to be considering the construction of a new line from the city limits to the Cedar Grove factory addition southwest of the city.

***Brockton, Mass.**—Plans are being considered for an electric railway to connect Brockton with Providence, by way of Easton, Mansfield and Attleboro. A preliminary meeting was held in Mansfield on July 25, which Mayor Harry C. Howard and A. H. Andrews, president of the Chamber of Commerce, attended.

**Brooklyn (N. Y.) Rapid Transit Company.**—This company is asking for bids on 90,000 tons of structural steel, and is securing options on an additional 60,000 tons.

**International Railway, Buffalo, N. Y.**—The Public Service Commission, Second District, has denied the application of the International Traction Railways for a certificate of public convenience and necessity. The proposed railroad was to be built in the Abbott road between Cazenovia Street and the southerly city line of Buffalo, which boundaries would be its termini. The road was to extend a distance of 1.20 miles. The construction of the proposed railroad was part of the plan for the reorganization of the street railroad system of Buffalo. The general scheme of reorganization has been abandoned for another and the company is not desirous of constructing the line.

**Interborough Rapid Transit Company, New York, N. Y.**—This company will shortly order 87,000 tons of structural steel for third-tracking and extension of the Third Avenue elevated line.

**South Shore Traction Company, Patchogue, N. Y.**—Paul T. Brady and Willard V. King, receivers of the South Shore Traction Company, have applied to the Public Service Commission for approval of the franchise granted by the Board of Estimate and Apportionment, on July 15, 1912. The commission will give a hearing on the application on Aug. 2.

**Piedmont & Northern Railway, Charlotte, N. C.**—This company has awarded the contracts for the construction of 21 miles of its line between Spartanburg and Greenville, S. C., to the Parker Brooks Construction Company, Macon, Ga., and Willard Boggs & Company, Spartanburg, S. C. Another 12 miles of construction work was let recently to J. Thomas Bennett, Charlotte, N. C. Several steel bridges will be erected as follows: 900-ft. viaduct over Enoree River, 500-ft. at South Tiger River, 200-ft. at Middle Tiger River, and 300-ft. at North Tiger River, besides a 400-ft. viaduct at Fair Forest Creek. These will be steel structures, and contracts for them are expected to be let within a month by W. S. Lee, Charlotte, N. C.

***Allentown, Pa.**—Philadelphia and Allentown capitalists propose to build a 28-mile electric railway between Ithaca and Cortland, N. Y., via Croton, Freeville and Dryden. The capital stock of the new company will be $1,500,000. Eli Chandler, Atlantic City, president; Howard Chandler, Philadelphia, vice-president, and Charles W. Grossert, Allentown, chief engineer. Surveys are being made.

**Hanover & Mount Sherrystown Street Railway, Hanover, Pa.**—This company has received the approval of Governor Tener for the extension of its lines in Adams and York Counties.

**Lebanon & Campbelltown Street Railway, Lebanon, Pa.**—This company has advertised for proposals for the overhead construction work on the 10-mile extension of its line between Campbelltown and Cumberland Street, Lebanon. All bids were required to be submitted by July 29, 1912. H. N. Herr, engineer. [E. R. J., March 9, '12.]

***Lebanon, Tenn.**—The business men's club of Lebanon, Tenn., is urging the Great Falls Power Company, which is building a transmission line from Rock Island, on Caney Fork, where a large hydroelectric plant is to be built, to construct an electric railway through the territory traversed by the transmission line. The proposed route would be through Smithville, Alexandria Brush Creek, Buffalo Valley, Watertown, Lebanon, Baird's Mill, Gladeville, Mount Juliet and Nashville.

**Murfreesboro Electric Railway, Nashville, Tenn.**—As a guarantee that the Woodbury & Nashville interurban line will be built, J. L. Parkes, one of the promoters of the line, has deposited with Walter Hancock, trustee, a $10,000 forfeit, to be distributed among the stockholders if the road is not built within three years. [E. R. J., April 13, '12.]

**Nashville Railway & Light Company, Nashville, Tenn.**—The Board of Park Commissioners of Nashville, Tenn., is considering a plan to request the Nashville Railway & Light Company to extend its Fatherland Avenue line out Nineteenth Street to Shelby Park, which has been improved at a cost of $100,000.

**West Street Railway, Weston, W. Va.**—Work has been begun on the West Street Railway from its present terminus in Mount Claire, W. Va., to Weston, W. Va. Six miles of the road have been completed from Clarksburg to Mount Claire and there remains 18 miles to build to Weston. The contract for the grading has been let to R. T. Martin, Parkersburg; C. F. Kelly, Clarksburg, and Gilmore & Weaver, Morgantown.

## SHOPS AND BUILDINGS

**Central California Traction Company, Stockton, Cal.**—This company is about to double the capacity of its car shops just outside the city limits, so that it can handle all the car repair work for its lines in Stockton and Sacramento and also manufacture all its rolling stock. It is proposed to add to the present repair plant a building, 56 ft. x 102 ft., of corrugated iron, equipped with a woodworking plant, doubling the present capacity

**Southern Traction Company, East St. Louis, Ill.**—This company, which is to build a line from East St. Louis to Duquoin, Ill., has purchased two blocks of ground in East St. Louis on which it is proposed to erect buildings for shops and offices. The site for the new structures is on Baker Avenue, between Twenty-first Street and Twenty-fourth Street.

**Portland, Gray & Lewiston Railroad, Lewiston, Maine.**—This company will begin work shortly on a two-story brick terminal on Cumberland Avenue, Portland.

**Hattiesburg (Miss.) Traction Company**—The old Commercial Hotel building on West Pine Street, Hattiesburg, has been acquired by this company and will be fitted out for offices of the company.

**Durham (N. C.) Traction Company.**—During the next few weeks this company will award contracts to build a two-track addition to its carhouse and install a lathe, wheel press, drill press, boring machine and shaper.

**Dallas (Tex.) Electric Corporation.**—Stone & Webster, Boston, Mass., have purchased a site for an interurban terminal station in Dallas. It is estimated that the structure will cost $1,500,000.

### POWER HOUSES AND SUBSTATIONS

**Atlanta & Macon Railway, Atlanta, Ga.**—This company has practically completed its plans and surveys and intends in the near future to start construction on its proposed high-speed third-rail electric railway between Atlanta and Macon, a distance of 88½ miles, via Jonesboro, Griffin and Forsyth. C. G. Young, New York, N. Y., has been appointed consulting engineer, representing the interests financing the railway. Mr. Young recently appeared before the Georgia Railroad Commission in reference to the proposed issue of securities.

**Aurora, Elgin & Chicago Railroad, Chicago, Ill.**—This company will install in its power station at Wheaton, Ill., a 7500-kw Curtis turbo-generator, three 2800-kva, 2300-volt transformers and a switchboard panel. All this apparatus has been ordered from the General Electric Company.

**Rock Island Southern Railway, Monmouth, Ill.**—This company will make surveys soon for a transmission line from its power plant at Edwards River Station to Burlington, Ia. The route selected will be chosen so that it can be utilized later for an interurban line between the two cities.

**St. Joseph Valley Traction Company, LaGrange, Ind.**—This company has ordered one 300-kw rotary converter, three 100-kw transformers and switchboard, from the General Electric Company.

**Louisville (Ky.) Railway.**—The Louisville Lighting Company, which is controlled by H. M. Byllesby & Company, Chicago, Ill., is planning to submit a formal proposition to the Louisville Railway to furnish it with light and power for its lines. The proposal of the electric company has been broached informally to officers of the Louisville Railway. The latter is erecting a power house at Twentieth and High Streets.

**Winchester Light, Power & Traction Company, Winchester, Ky.**—The Dix River Power Company has been negotiating with the Winchester, Light, Power & Traction Company relative to supplying its lines with power from its station on the Dix River. Engineers are completing surveys at the confluence of the Dix River and the Kentucky River, and expect shortly to locate the site for the proposed plant.

**Philadelphia & Garrettford Street Railway, Philadelphia, Pa.**—This company will install in its substation at Llanerch, two 500-kw rotary converters, six 165-kva transformers and switchboard. This apparatus has been ordered from the General Electric Company and will supplement the main equipment for the station recently reported furnished by the same company.

**Chattanooga Railway & Light Company, Chattanooga, Tenn.**—This company has ordered from the General Electric Company new apparatus consisting of one 500-kw synchronous motor-generator set, one 2000-kva transformer, two 200-kva transformers and the necessary switchboard panels.

# Manufactures and Supplies

### ROLLING STOCK

**San José (Cal.) Railroad** has ordered four pay-as-you-enter cars from the Jewett Car Company.

**Fresno (Cal.) Traction Company** has ordered four pay-as-you-enter cars from the Jewett Car Company.

**Slate Belt Electric Street Railway, Penn Argyl, Pa.,** is in the market for one car for November delivery.

**Texas City Terminal Railway, Texas City, Tex.,** has ordered one 55-ft. all-steel gasoline car from the McKeen Motor Car Company.

**Evansville, Henderson & Owensboro Railway, Evansville, Ind.,** has received from the American Car Company three passenger cars and one freight car.

**Syracuse (N. Y.) Rapid Transit Company** has ordered nine double-truck pay-as-you-enter cars from the St. Louis Car Company, also one low-step type center-entrance car from the G. C. Kuhlman Car Company.

**Northern Ohio Traction & Light Company, Akron, Ohio,** has ordered thirty-five cars from the G. C. Kuhlman Car Company. Ten of the cars will be for interurban use. Twenty-five will be of the type used on Main and East Market Streets in Akron and are intended for service in that city.

**Elmira Water, Light & Railroad Company, Elmira, N. Y.,** has ordered eight 33-ft. semi-convertible pay-as-you-enter cars through W. R. Kerschner from the Cincinnati Car Company. Four of these cars will be equipped with Standard O-45 motor trucks and four with Standard C-50 motor trucks. The cars are 46 ft. 8 in. over all, and are equipped with Consolidated heaters, Heywood seats, Hedley anti-climbers and Hunter signs.

**Pittsburgh (Pa.) Railways** has constructed in its shops and put into service on July 7 for trial operation a new type of center-entrance low-step car. Its body construction is similar in practically all respects to the trailer cars with small wheels and low floors which have been in operation in Pittsburgh for the past two years and is equipped with "baby" motors designed and built especially for the small wheels. The seating capacity is 67 and by actual count the car will hold 113 people under service conditions. The total weight, completely equipped, is only 32,650 lb.

**Grand Rapids (Mich.) Railway,** reported in the ELECTRIC RAILWAY JOURNAL of June 29, 1912, as having ordered ten closed motor car bodies from the Cincinnati Car Company, has specified the following details for this equipment:

| | |
|---|---|
| Seating capacity.....36 | Curtain fixtures, Curtain S. Co. |
| Length of body....28 ft. 0 in. | Hand brakes.....Peacock |
| Length over vestibule, 42 ft. 8 in. | Headlights ....Crouse-Hinds |
| Width over all....7 ft. 10 in. | Motors.....G. E. No. 216 |
| Sill to trolley base..8 ft. 10 in. | Sanders.....Ohio Brass Co |
| Interior trim.....cherry | Seats.....H. & K. |
| Headlining..bird's-eye maple | Step treads.....Universal |
| Air brakes.....G. E. | Trucks.....Brill No. 27 G-1 |
| Destination signs....Hunter | |

### TRADE NOTES

**Griffin Car Wheel Company, Chicago, Ill.,** will enlarge its Boston plant, building an addition to the foundry, a new machine shop and auxiliary buildings. This it is planned will increase the present capacity more than 200 wheels per day. The company will also enlarge the St. Paul plant, increasing the production of that plant 150 wheels per day.

**Monarch Brake Company, Cumberland, Md.,** has been incorporated under the laws of Maryland, to take over the patents, manufacture and market the Fresh worm-geared hand brakes invented by Henry Fresh, of Cumberland, Md. The officers of the company are: Henry Fresh, president; J. T. Laughlin, Luke, Md., vice-president; C. G. Smith, treasurer; Olen Gunnett, Frostburg, Md., secretary, and J. W. Thomas, attorney.

**Pennsylvania Steel Company, Steelton, Pa.,** has appointed R. W. Gillispie its New York sales agent, with headquarters at 71 Broadway, New York. Mr. Gillispie

succeeds John C. Jay, Jr., who has been appointed acting general manager of sales, with offices at Philadelphia. Mr. Gillispie has been connected with the New York office of the Pennsylvania Steel Company since 1906. His territory takes in all of New York State and parts of New Jersey and Connecticut.

**Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.,** at a meeting of the stockholders at which more than 23,000 shares were represented, voted in favor of liquidating the corporation. The company owes no indebtedness of any sort and has a large amount of cash on hand. The sole reason for the step is that it has too large a plant and too much capital invested for the volume of business to be obtained. A plan is being formulated looking to the organization of a new and smaller company to take over portions of the plant, machinery, merchandise, etc., and continue the business of the present company. Details of this plan will be announced as soon as they can be perfected.

**Vulcan Engineering Sales Company, Chicago, Ill.,** has taken the selling agency for the line of structural and plate-working machinery, punches, shears, rolls, bulldozers, etc., manufactured by the Rock River Machine Company, Janesville, Wis. This is in addition to the lines now controlled by the Vulcan Engineering Sales Company, which include the product of the Hanna Molding Machine Works, making pneumatic riveters; the Mumford Molding Machine Company, making molding machines and foundry equipment, and the Q M S Company, making metal-sawing machinery and shop equipment. The Vulcan Engineering Sales Company makes a specialty of machinery for structural and boiler shops and foundries.

**J. G. White & Company, Ltd., London, Eng.,** held their thirteenth ordinary general meeting in London recently. Lord Arthur Butler in his report stated in part: "The net profit for the year amounts to £87,106, which, although £4,360 less than in the record year of 1911, is far greater than any other year in our history, and enables us, after making substantial provisions for reserves, to recommend the same dividends as last year. The quick assets of the company in the form of cash, loans at call and short-time loans amount to £186,746—nearly equal to the total capital of the company and more than three times the total creditors shown on the other side of the balance sheet. The amount of investment account, viz., £106,162, is approximately £46,000 higher than a year ago. Plant, instruments and stock materials have been written down to £1 nominal valuation, following our usual custom. The purchase of business or good-will was written off last year, and stands at the nominal value of £1. Regarding the distribution of profits, we have first set aside £25,000 to add to our dividend equalization fund, making this reserve now £40,000; in other words, nearly one-third of the profit earned is being retained for the present in the business. The balance permits us to recommend a dividend (after taking into account the interim dividend paid in January last), amounting to 12 per cent on the whole of the preferred shares of the company and also 12 per cent on the ordinary shares and a further extra dividend of 10s. per share, or a total of 62 per cent upon the ordinary shares. The amount carried forward to next year's account will be increased from £19,812 to £21,211."

**General Electric Company, Schenectady, N. Y.,** has called a special meeting of its stockholders for Aug. 29, 1912, to vote upon a proposition to increase the capital stock of the company from $80,000,000 to $105,000,000. After such increase there will be paid to stockholders of record Dec. 31, 1912, out of the surplus earnings of the company a dividend of $30 per share, payable in stock of the company at par. This dividend is to recoup stockholders in part for dividends passed or reduced in period of years after 1893. For the future financial needs of the company it is proposed to issue debentures from time to time, and for this purpose the directors have authorized an issue of debentures limited to the sum of $60,000,000. The company has recently received the following orders for car equipments: Jackson Railway & Light Company, Jackson, Miss., five GE-216 50-hp four-motor car equipments and five straight-air-brake equipments with CP-27 compressors; Twin City Rapid Transit Company, Minneapolis, Minn., ten GE-203 50-hp four-motor car equipments, forty-seven K-37-c control equipments and fifty-seven straight-air-brake equipments with CP-27 compressors; Schenectady (N. Y.) Railway, ten GE-203 50-hp four-motor car equipments and ten straight-air-brake equipments with CP-27 compressors; Millville (N. J.) Traction Company, two GE-87 60-hp railway motors; Jersey Central Traction Company, Keyport, N. J., one GE-216 50-hp four-motor car equipment and one straight-air-brake equipment with CP-27 compressor; Gary & Interurban Railway, Gary, Ind., four GE-226 45-hp four-motor car equipments and four straight-air-brake equipments with CP-27 compressors; Southern Traction Company, Waco, Tex., four GE-203-A 50-hp two-motor car equipments; Saginaw & Bay City Railway, Saginaw, Mich., four GE-219 50-hp car motors and two K-35 control equipments.

## ADVERTISING LITERATURE

**Siemens & Halske Company, Berlin, Germany,** has issued a new publication in German describing its electrical device for giving an audible signal in the cab when a locomotive overruns a stop indication.

**Duplex Metals Company, Chester, Pa.,** has issued a forty-six page publication, "Copper-Clad Steel for Telephone Service," which contains a complete description of the process, application and uses of copper-clad steel wire as manufactured by the company.

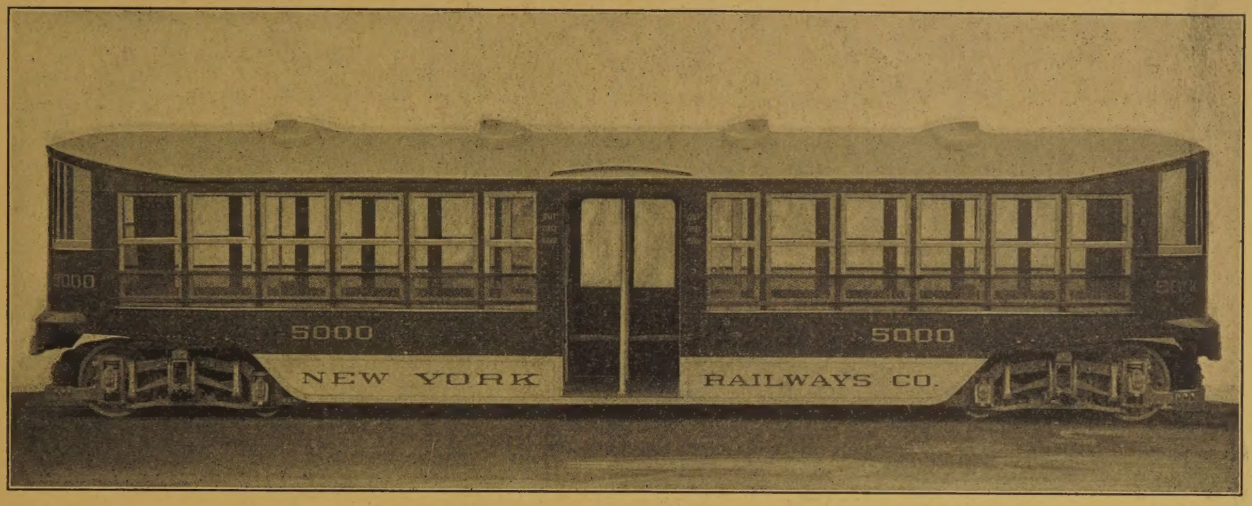
**Electric Service Supplies Company, Philadelphia, Pa.,** devoted the *Keystone Traveller* for July, 1912, to a description of the new building now occupied by the company, explaining the various departments, their work and the method of carrying it out. There is also a detailed résumé of the organization and growth of the company.

**Tool Steel Gear & Pinion Company, Cincinnati, Ohio,** has issued a book entitled "Records on Gears and Pinions." It contains the comparative mileage records of about thirty electric railways and a considerable amount of information on such subjects as the advisability of running tool steel pinions with soft gears, also other interesting topics in connection with the general gearing field.

**Mica Insulator Company, New York, N. Y.,** has just issued Bulletins 78, 79, 80, 81 and 82, in a convenient binder. These bulletins bring out in a very striking manner the great variety of uses for which mica and other of the company's insulating materials are adapted. Bulletin No. 78 covers sheets, paper, washers, spools, segments, plates, cloth, disks, tubes, rings, rheostat insulation and commutator insulation; No. 79, rings and segments for railway and air-brake motors and washers and tubes for grid resistances; No. 80, Empire oil-treated muslin, cambric, linen, silk, canvas, duck, papers, tapes, tubes, linotape, Kablak fabrics and papers; No. 21, uncut sheet mica, ground mica, mica washers and disks of random thickness; No. 82, friction tape, shellac, varnish, cements, linolac, M.I.C. compound and untreated papers, fullerboard, fish paper, fiber, muslin, duck, canvas, linen, etc., tapes and sleeving. A general index and code accompanies the bulletins.

**Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.,** has issued a series of Descriptive Leaflets (Nos. 2465 to 2473), illustrating the new line of switchboard 2-in. and 9-in. indicating meters: Leaflet No. 2494 fully illustrates and describes the Westinghouse synchronous booster rotary converter; No. 2499 describes Westinghouse commutating-pole direct-current motors (type QM) for compressors, blowers, pumps and similar classes of service; No. 2480 contains rules for the selection of machine-tool motors; Circular 1516 describes and illustrates in detail electric locomotives as built by the Westinghouse Electric & Manufacturing Company jointly with the Baldwin Locomotive Company. The publication discusses the field of application of the electric locomotives to both steam and electric railways and shows numerous applications on roads throughout the country. "Switchboard Meters" is the title of a publication issued by the company which fully describes the complete line of switchboard meters recently brought out by the company. The circular also contains reprints of papers by Paul McGahan on "Modern Tendencies in the Design of Switchboard Indicating Meters" and on "Theory and Performance of Induction Instruments."

BRILL CITY AND INTERURBAN CARS AND TRUCKS BRILL




# The Stepless Car

THE best way to encourage the riding habit among the patrons of any line is, of course, to provide a car that is attractive enough to make people want to ride in it. But almost any well ventilated and easy riding car is good enough after the passenger is seated—it is the getting in and out that is the drawback. Consciously or unconsciously people decide to walk short distances where, if the cars were easier entered and left, they would ride; elderly people, women who must perforce take infants or children with them, scores of men and women, both young and old, to whom small discomforts seem important, and other classes needless to mention, all avoid using the cars with high steps any more than necessary. The Stepless Car, with its safe and easy entrance and exit, encourages those who have but a few blocks to go to use the trolley; for infirm persons and for women with children it is ideal; for those who would rather stay at home than put themselves in the way of discomfort, inconvenience or the slightest risk of accident, and they are a large class in any community, the car has no terrors, but only comforts, conveniences and assurance of absolute safety, and encourages them to ride and makes the ride a pleasurable part of every shopping, business or pleasure trip. We are the builders of Stepless Cars under the Hedley-Doyle designs and patents controlled by the Prepayment Car Sales Company.

**THE J. G. BRILL COMPANY**
**Philadelphia, Pa.**

**AMERICAN CAR COMPANY**
**St. Louis, Mo.**

**JOHN STEPHENSON COMPANY**
**Elizabeth, N. J.**

**G. C. KUHLMAN COMPANY**
**Cleveland, Ohio**

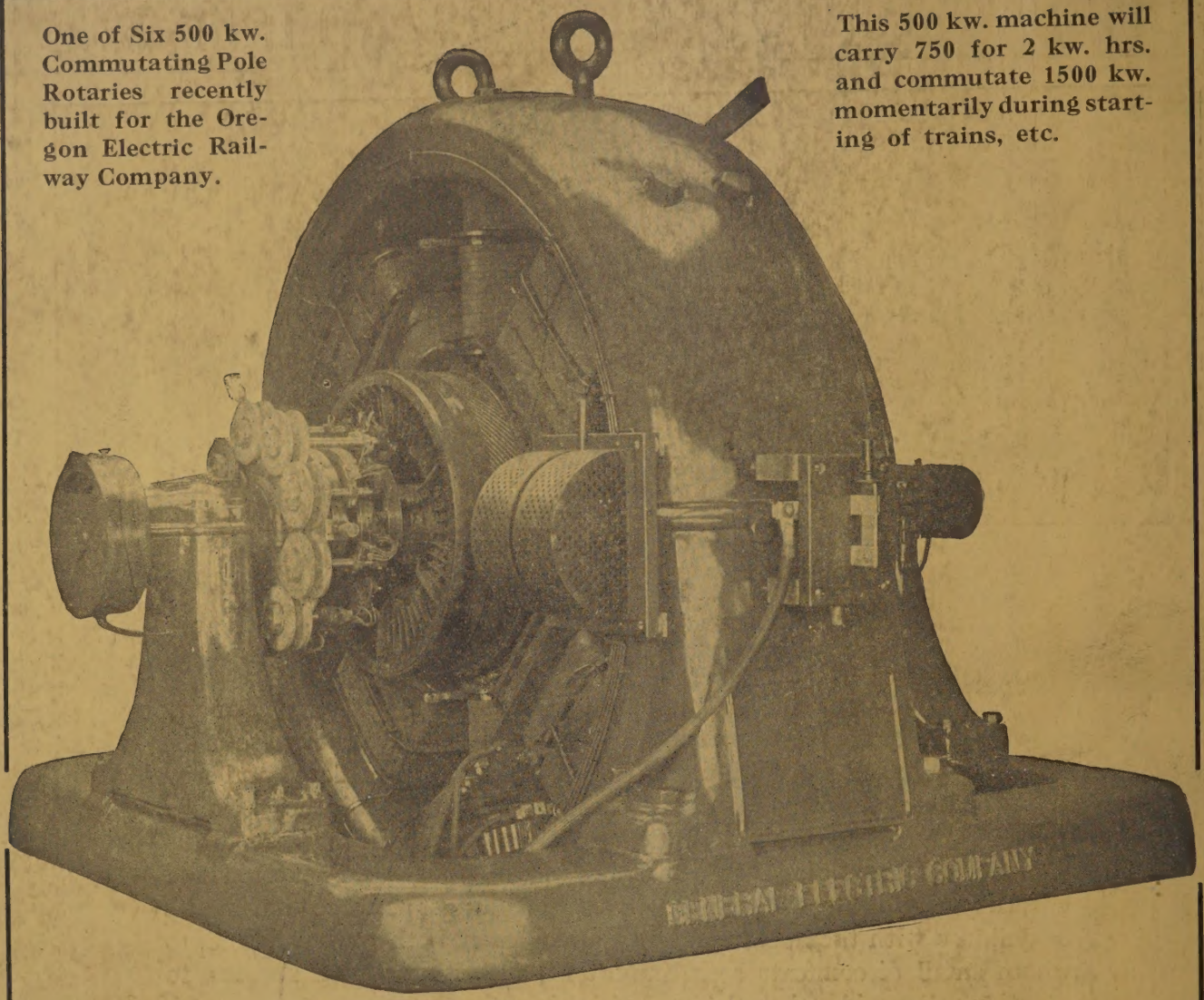
**WASON MANUFACTURING COMPANY**
**Springfield, Mass.**

**COMPAGNIE J. G. BRILL**
**Paris, France**

BRILL THE J.G.BRILL COMPANY, PHILADELPHIA BRILL

One of Six 500 kw. Commutating Pole Rotaries recently built for the Oregon Electric Railway Company.

This 500 kw. machine will carry 750 for 2 kw. hrs. and commutate 1500 kw. momentarily during starting of trains, etc.



# Enormous Overloads are Easily Carried By the G-E Commutating Pole Rotaries

This large increase in maximum capacity made possible by the commutating pole converter introduced by the General Electric Company two years ago, has revolutionized substation practice through the ability of this type of machine to successfully commutate the peak loads and provide a high all-day efficiency with minimum floor space and minimum first cost. ¶ G-E Commutating Pole Rotaries are rated on a conservative basis and will carry 50% overloads during rush hours with the same degree of reliability and low maintenance expense which have characterized G-E Rotaries ever since their introduction to Railway Service.

# General Electric Company

**Largest Electrical Manufacturer in the World**
**Principal Office, Schenectady, New York**
**Sales Offices in all Large Cities**

**District Offices in**

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boise, Idaho
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Davenport, Ia.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
(Off. of Sol'g Agt.)
Erie, Pa.
Indianapolis, Ind.
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Keokuk, Ia.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Philadelphia, Pa.
Pittsburg, Pa.
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Rochester, N. Y.
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St. Louis, Mo.
Seattle, Wash.
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